COLORADO RIVER BASIN
WESTERN GULF BASIN
Volume 9

Public Health Service
Water Pollution Surveillance System

ANNUAL COMPILATION OF DATA
October 1, 1962 - - - September 30, 1963

A Federal, State and Local cooperative report on water pollution surveillance of surface waters at selected locations throughout the United States

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, Division of Water Supply and Pollution Control
Washington, D.C. 20201

RELATED PUBLICATIONS:

National Water Quality Network
Annual Compilation of Data, October 1, 1957–September 30, 1958
Public Health Service Publication No. 663 (1958 Edition)

National Water Quality Network
Statistical Summary of Selected Data, October 1, 1957–September 30, 1958
Public Health Service Publication No. 663—Supplement 1

National Water Quality Network
Annual Compilation of Data, October 1, 1958–September 30, 1959
Public Health Service Publication No. 663 (1959 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1959–September 30, 1960
Public Health Service Publication No. 663 (1960 Edition)

National Water Quality Network
Plankton Population Dynamics, July 1, 1959–June 30, 1961
Public Health Service Publication No. 663—Supplement 2

National Water Quality Network
Annual Compilation of Data, October 1, 1960–September 30, 1961
Public Health Service Publication No. 663 (1961 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1961–September 30, 1962
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ACKNOWLEDGMENT

To increase the usefulness of the water quality data, annual compilations since 1958, including this one, have presented preliminary and unadjusted flow data for gaging stations at or near most of the Public Health Service Water Pollution Surveillance System sampling points. Final data may be obtained directly from the agency concerned. Any studies using the provisional flow data herein compiled should verify the data prior to completion of reports on such studies. For making the flow information available for this publication, grateful acknowledgment is made by the Public Health Service to:

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Bureau of Reclamation • Geological Survey

The U.S. Department of the Army
Corps of Engineers • Lake Survey

FOREWORD

This is the sixth annual compilation of data from the Public Health Service Water Pollution Surveillance System (formerly the National Water Quality Network). During this year, the System was increased from 122 to 128 stations. In order to provide data in a form more useful for local or regional water pollution control officials and their staffs, the present compilation is published in 11 separate volumes. The surveillance data reported herein reveal additional findings on pesticides and other organic chemicals in surface waters and on trends in radioactivity and other areas.

The Public Health Service gratefully acknowledges the assistance to our Surveillance System of the participating local, State and Federal Government agencies and private industry. The success of this program depends, in a large measure, upon their continued interest and support.

GORDON E. MCCALLUM, D. Sc.,
Assistant Surgeon General,
Chief, Division of Water Supply and Pollution Control

VOLUME 1

Northeast Basin

CONNECTICUT RIVER
at Enfield Dam, Conn.
below Northfield, Mass.
at Wilder, Vt.

HUDSON RIVER
below Poughkeepsie, N.Y.

LAKE ERIE
at Buffalo, N.Y.

MERRIMACK RIVER
above Lowell, Mass.

RARITAN RIVER
at Perth Amboy, N.J.

ST. LAWRENCE RIVER
at Massena, N.Y.

VOLUME 2

North Atlantic Basin

DELAWARE RIVER
at Philadelphia, Pa.
at Trenton, N.J.
at Martins Creek, Pa.

POTOMAC RIVER
at Washington, D.C.
at Great Falls, Md.
at Williamsport, Md.

SCHUYLKILL RIVER
at Philadelphia, Pa.

SHENANDOAH RIVER
at Berryville, Va.

SUSQUEHANNA RIVER
at Conowingo, Md.
at Sayre, Pa.

VOLUME 3

Southeast Basin

APALACHICOLA RIVER
at Chattahoochee, Fla.

CHATTAHOOCHEE RIVER
at Columbus, Ga.
at Lanett, Ala.
at Atlanta, Ga.

ESCAMBIA RIVER
at Century, Fla.

ROANOKE RIVER
at John H. Kerr Dam and
Reservoir, Va.

SAVANNAH RIVER
at Port Wentworth, Ga.
at North Augusta, S.C.

TOMBIGBEE RIVER
below Columbus, Miss.

VOLUME 4

Western Great Lakes and Lake Erie Basins

WESTERN GREAT LAKES

DETROIT RIVER
at Detroit, Mich.

LAKE MICHIGAN
at Gary, Ind.
at Milwaukee, Wis.

LAKE SUPERIOR
at Duluth, Minn.

ST. CLAIR RIVER
at Port Huron, Mich.

ST. MARYS RIVER
at Sault Ste. Marie, Mich.

LAKE ERIE BASIN

CUYAHOGA RIVER
at Cleveland, Ohio

MAUMEE RIVER
at Toledo, Ohio

VOLUME 5

Ohio and Tennessee River Basins

OHIO RIVER BASIN

ALLEGHENY RIVER
at Pittsburgh, Pa.

CUMBERLAND RIVER
at Clarksville, Tenn.

KANAWHA RIVER
at Winfield Dam, W. Va.

LITTLE MIAMI RIVER
at Cincinnati, Ohio

MONONGAHELA RIVER
at Pittsburgh, Pa.

OHIO RIVER
at Cairo, Ill.
at Evansville, Ind.
at Louisville, Ky.
at Cincinnati, Ohio
at Huntington, W. Va.
below Addison, Ohio
at Toronto, Ohio

WABASH RIVER
at New Harmony, Ind.

TENNESSEE RIVER BASIN

CLINCH RIVER
above Kingston, Tenn.
at Clinton, Tenn.

TENNESSEE RIVER
at Pickwick Landing, Tenn.
at Bridgeport, Ala.
at Chattanooga, Tenn.
at Lenoir City, Tenn.

VOLUME 6

Upper Mississippi River Basin

ILLINOIS RIVER
near Grafton, Ill.
at Peoria, Ill.

MISSISSIPPI RIVER
at Cape Girardeau, Mo.
at East St. Louis, Ill.
at Burlington, Iowa
at Dubuque, Iowa
at Lock and Dam 3 below St. Paul, Minn.

RAINY RIVER
at Baudette, Minn.
at International Falls, Minn.

RED RIVER (NORTH)
at Grand Forks, N. Dak.

VOLUME 7

Missouri River Basin

BIG HORN RIVER
at Hardin, Mont.

BIG SIOUX RIVER
below Sioux Falls, S. Dak.

KANSAS RIVER
at DeSoto, Kans.

MISSOURI RIVER
at St. Louis, Mo.
at Missouri City, Mo.
at Kansas City, Kans.
at St. Joseph, Mo.
at Omaha, Nebr.
at Yankton, S. Dak.
at Bismarck, N. Dak.
at Williston, N. Dak.

NORTH PLATTE RIVER
above Henry, Nebr.

PLATTE RIVER
above Plattsmouth, Nebr.

SOUTH PLATTE RIVER
at Julesburg, Colo.

YELLOWSTONE RIVER
near Sidney, Mont.

VOLUME 8

Southwest-Lower Mississippi River Basin

ARKANSAS RIVER
at Pendleton Ferry, Ark.
at Little Rock, Ark.
near Forth Smith, Ark.
near Ponca City, Okla.
at Coolidge, Kans.

MISSISSIPPI RIVER
at New Orleans, La.
at Delta, La.
at Vicksburg, Miss.
at West Memphis, Ark.

OUACHITA RIVER
at Bastrop, La.

RED RIVER (SOUTH)
at Alexandria, La.
at Bossier City, La.
at Index, Ark.
at Denison, Tex.

VERDIGRIS RIVER
at Nowata, Okla.

VOLUME 9

Colorado River and Western Gulf Basins

COLORADO RIVER BASIN

ANIMAS RIVER
at Cedar Hill, N. Mex.

COLORADO RIVER
at Yuma, Ariz.
above Parker Dam, Ariz.-Calif.
near Boulder City, Nev.
at Page, Ariz.
at Loma, Colo.

GREEN RIVER
at Dutch John, Utah

SAN JUAN RIVER
at Shiprock, New Mex.

WESTERN GULF BASIN

RIO GRANDE
at Brownsville, Tex.
at Laredo, Tex.
at El Paso, Tex.
below Alamosa, Colo.

SABINE RIVER
near Ruliff, Tex.

VOLUME 10

Pacific Northwest and Alaska Basins

PACIFIC NORTHWEST

CLEARWATER RIVER
at Lewiston, Idaho

COLUMBIA RIVER
at Clatskanie, Oreg.
at Bonneville, Oreg.
at McNary Dam, Oreg.
at Pasco, Wash.
at Wenatchee, Wash.
at Northport, Wash.

PEND OREILLE RIVER
at Albeni Falls Dam, Idaho

SNAKE RIVER
at Ice Harbor Dam, Wash.
at Wawawai, Wash.
at Payette, Idaho

SPOKANE RIVER
at Post Falls Dam, Idaho

WILLAMETTE RIVER
at Portland, Oreg.

YAKIMA RIVER
at Richland, Wash.

ALASKA BASIN

CHENA RIVER
at Fairbanks, Alaska

SHIP CREEK
at Anchorage, Alaska

VOLUME 11

California and the Great Basins

CALIFORNIA BASIN

KLAMATH RIVER
near Keno, Oreg.

SACRAMENTO RIVER
at Greens Landing above Courtland, Calif.

SAN JOAQUIN RIVER
near Vernalis, Calif.

GREAT BASIN

BEAR RIVER
above Preston, Idaho

TRUCKEE RIVER
at Calif.-Nev. Border
at Farad, Calif.

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Dash (—) indicates no determination made.

THE PUBLIC HEALTH SERVICE

Water Pollution Surveillance System

The Public Health Service program for providing fundamental information on the quality of the Nation's waters stems from Public Law 660, approved July 9, 1956, as amended by Public Law 87-88, July 20, 1961. Section 4(c) thereof states: ". . . the Secretary (of Health, Education, and Welfare) shall in cooperation with other Federal, State, and local agencies having related responsibilities, collect and disseminate basic data on chemical, physical, and biological water quality insofar as such data or other information relate to water pollution and the prevention and control thereof."

To fulfill this responsibility, the Public Health Service Water Pollution Surveillance System collects, interprets, and disseminates:

a. Information on changes in water quality at key points in river systems, as such quality may be affected by changes in water use and development.

b. Continuous information on the nature and extent of pollutants affecting water quality.

c. Data which will be useful in the development of comprehensive water resources programs.

d. Data which will assist State, interstate, and other agencies in their water pollution control programs, and in the selection of sites for legitimate water uses.

Some 50 sampling stations were established when the program started, October 1, 1957. By September 30, 1963, the number had grown to 128.

Each sampling location satisfies one or more of the following criteria:

a. Major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

b. Interstate, coastal, and international boundary waters.

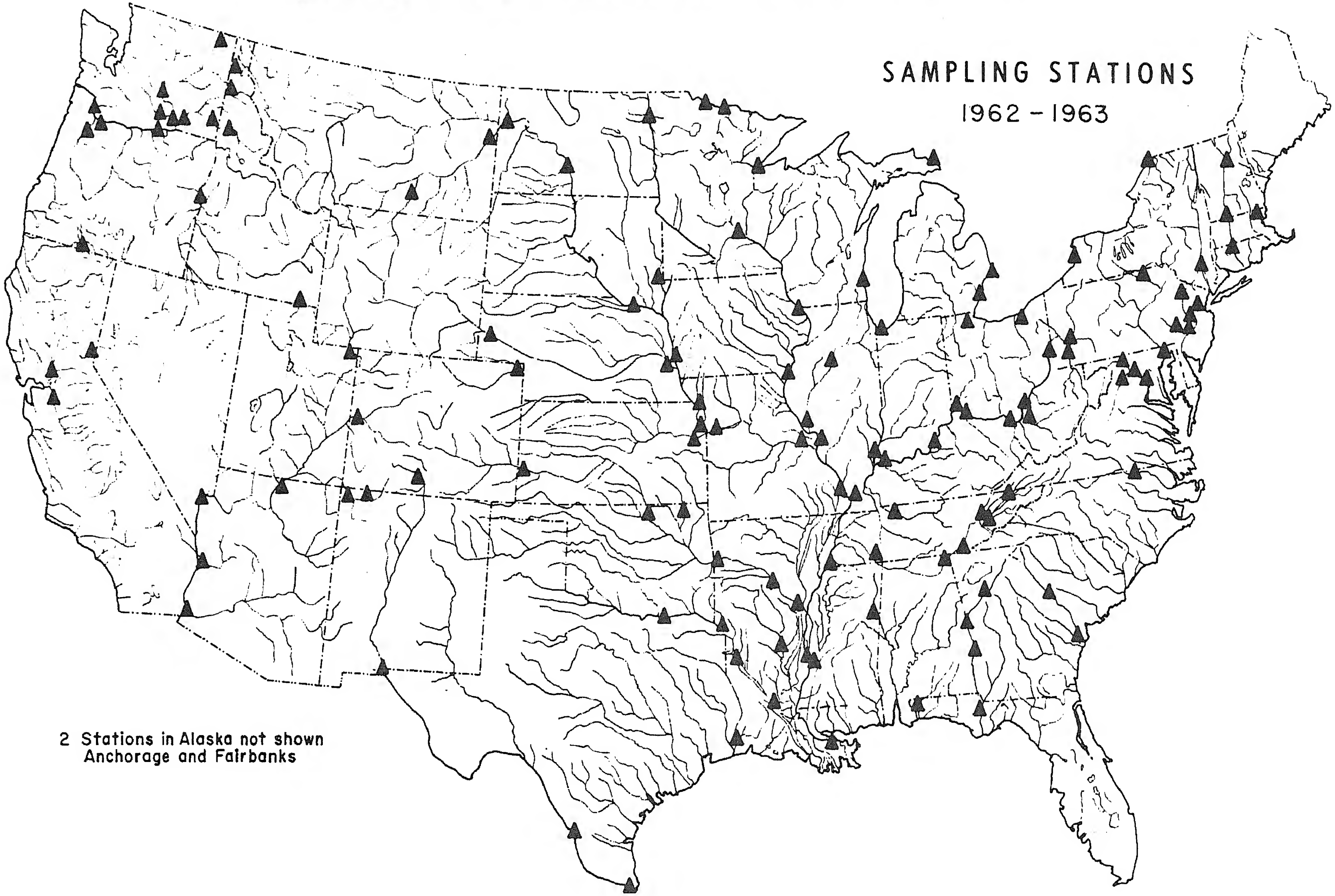
c. Waters on which activities of the Federal Government may have an impact.

Sampling station sites are fixed only after consultation with local, State, Federal and other agencies having related interests.

Active local participation is important in this operation. It assures maximum development of all information valuable both locally and nationally. Program costs are shared by the Federal Government and State and local agencies, those of the latter through contributions of laboratory and sampling manpower. Specifically, the State and local agencies perform certain of the conventional chemical analyses and collect samples for the newer, more complex examinations. The Public Health Service, in turn, performs the more complex determinations and makes the results available to the participants and to the public. In addition, the consultation, training facilities, and other resources of the Public Health Service are available to the cooperating agencies.

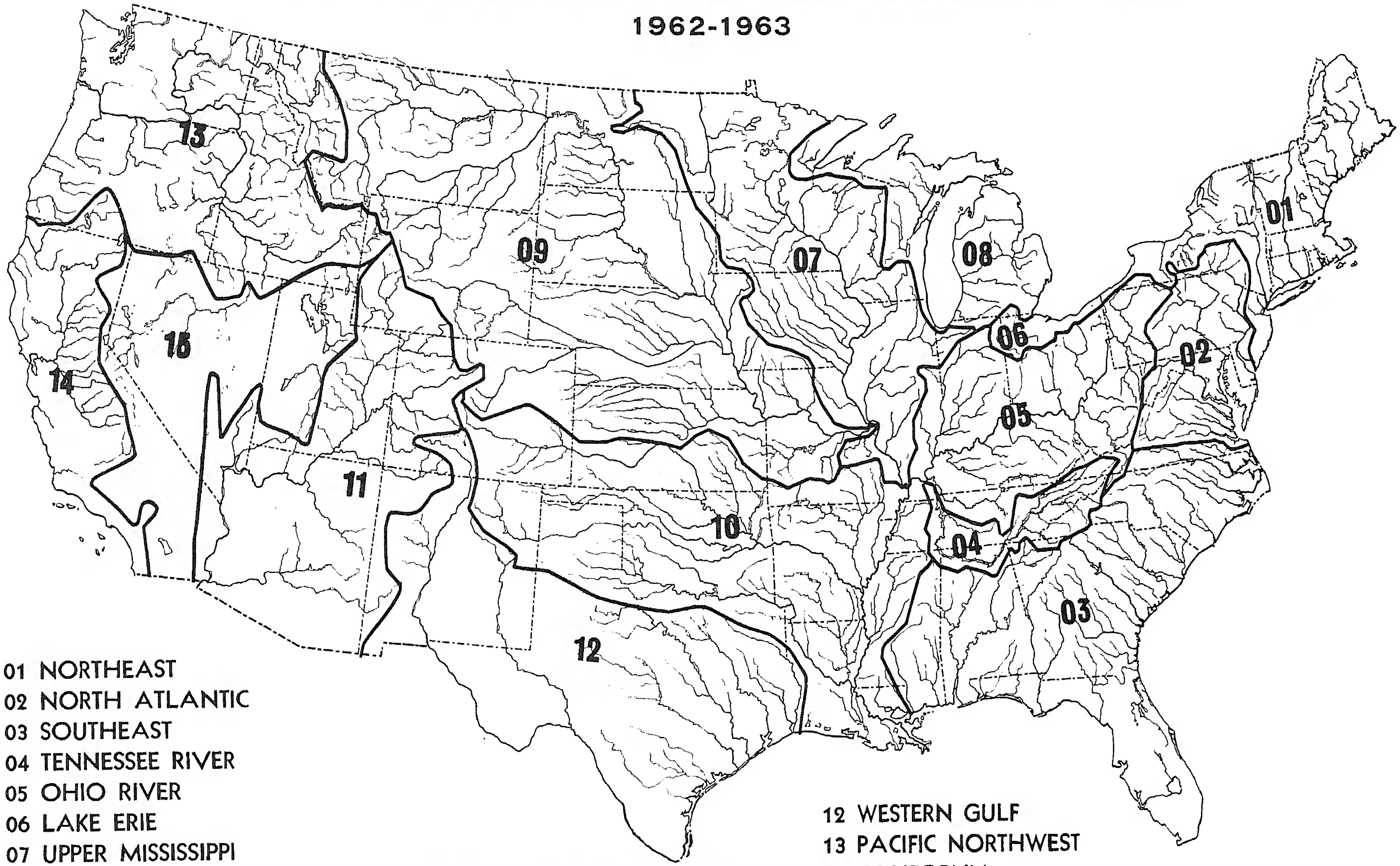
Locations of sampling stations in operation as of September 30, 1963, are shown on page 2. Descriptions of the stations, participating agencies, and other pertinent information are presented with the station data.

PHS Water Pollution Surveillance System



MAJOR RIVER BASINS OF THE UNITED STATES

1962-1963



01 NORTHEAST
02 NORTH ATLANTIC
03 SOUTHEAST
04 TENNESSEE RIVER
05 OHIO RIVER
06 LAKE ERIE
07 UPPER MISSISSIPPI
08 WESTERN GREAT LAKES
09 MISSOURI RIVER
10 SOUTHWEST—LOWER MISS.
11 COLORADO RIVER
12 WESTERN GULF
13 PACIFIC NORTHWEST
14 CALIFORNIA
15 GREAT BASIN

Only after careful screening of needs in water resource development was a pattern set for analyses of water samples.

All System samples are examined for:

a. Radioactivity.
   (1) Gross alpha.
   (2) Gross beta.
   (3) Strontium 90.

b. Plankton populations.

c. Coliform organisms.

d. Organic chemicals.

e. Biochemical, chemical, and physical measurements, including biochemical oxygen demand (BOD), dissolved oxygen (DO), chemical oxygen demand (COD), chlorine demand, ammonia nitrogen, hydrogen ion concentration (pH), color turbidity, temperature, alkalinity, hardness, chloride, sulfate, phosphates and total dissolved solids.

f. Sodium, potassium, fluoride and trace elements.

Samples for groups c and e were collected and analyzed weekly. Samples for organic chemicals were collected and analyzed monthly and plankton organism examinations were conducted semimonthly. Water samples for analysis of suspended and dissolved gross alpha and beta radioactivity were submitted weekly. Strontium 90 analyses were made on composites of weekly samples accumulated over 3-month periods. Sodium, potassium, fluoride, and trace metals were also determined on 3-month composites of weekly samples. New parameters which are developed and found significant will be included as the program continues.

Analytical Methods and Reliability of Data

The physical, chemical and biochemical data documented in this publication are the result of efforts of the cooperating agencies. In general, about half of these measurements were contributed by their laboratories. Specifically, all measurements reported for temperature, pH, DO, BOD, COD, chlorine demand and ammonia nitrogen were performed by the participants at the sample collection point. In addition, about 45 of the participating groups regularly perform all or most of the determinations for the remaining parameters included in the data. Whenever possible, analyses for stable constituents not completed by the participants are completed in the central Water Quality laboratories. While individual laboratories make minor modifications to meet local conditions, the methods used in most cases are those published in the 11th edition, "Standard Methods for the Examination of Water and Wastewater" (22). For uniformity, the chlorine demand test is reported on the basis of the starch-iodide titration procedure, and the chemical oxygen demand test is restricted to the use of 0.025 N reagents.

To assure continued reliability in the published data, frequent analysis of reference samples are made by each cooperating laboratory as an integral part of the overall program. Periodically a synthetic standard sample is provided to each participant for reference analysis. The reported results are reviewed. Any significant errors are called to the attention of the reporting laboratory and, after the cause of the errors has been determined, the previously submitted data are either corrected or discarded. From these findings, the analyses reported in this compilation are believed to be accurate to ± 10 percent of the reported values.

The analytical methods used by the Public Health Service laboratories are described in the discussion of water quality parameters which follows, and are covered by references listed in the Bibliography.

Water Pollution Parameters

In the assessment of water pollution, all of the legitimate purposes for which raw waters can be used, and which may be affected by pollution, must be considered. These may range from the minimum requirements for navigation to the ultimate in water quality demanded for certain industrial processing. Standards differ considerably, therefore, according to water use.

For domestic use, water must be free of disease organisms, clear, colorless, taste- and odor-free, and have a relatively low dissolved mineral content. Agricultural water is judged primarily on its mineral content, especially with respect to the ratio of sodium to other cations, and the presence of boron. Water for fish propogation and recreational purposes must be relatively free from domestic and industrial pollution and must be able to sustain an active flora of the smaller aquatic organisms on which fish and wildlife feed. Industrial water quality demands run the gamut from the complete absence of minerals to a requirement of low temperature, the critical factor in water used for cooling. The effects of radioactive materials on these uses have not yet been fully appraised.

The various laboratory examinations made as part of this program are discussed below.

Radioactivity

Radioactivity, long recognized as a water contaminant from natural sources, has continued to grow in importance and health significance with the development of nuclear energy for both military and peaceful uses. Consequently, levels must be measured continually as new sources are established.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The total radioactivity in the dissolved solids provides a rough measure of the levels which may be found in a treated water, where water treatment removes substantially all of the suspended matter.

Beta activity levels generally reflect the variable contamination resulting from fallout and discharges from nuclear energy installations, institutions utilizing radioactive materials, and other manmade sources. The trend of gross beta radioactivity in samples received from 47 of the Public Health Service Water Pollution Surveillance System stations operating since 1957 is presented in Figure 1. During the first three quarters of the 1962 water year, renewed weapons testing resulted in a rise in gross beta radioactivity in surface waters of the United States. During the sec-

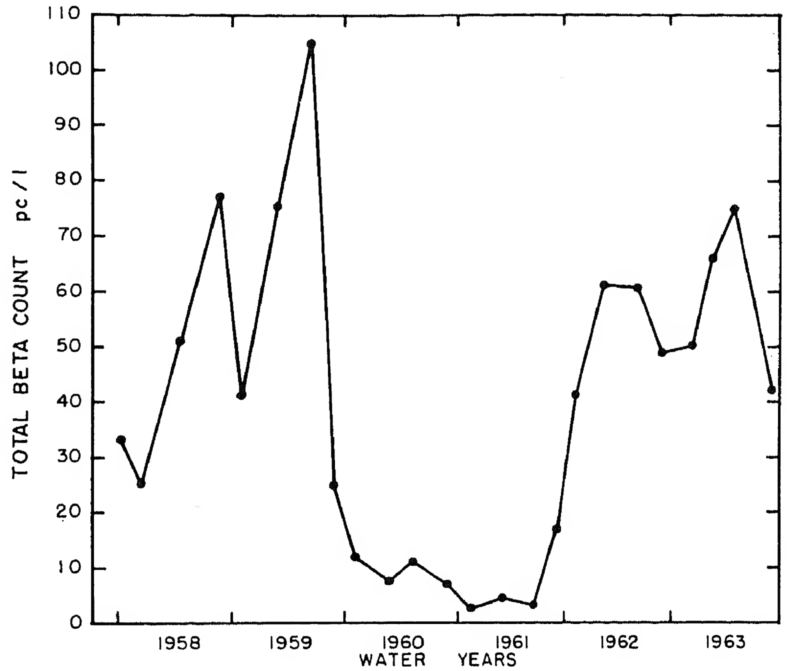


FIGURE 1. GROSS BETA RADIOACTIVITY IN THE SURFACE WATERS OF THE UNITED STATES.

ond and third quarter of water year 1963, the national average activity reached a maximum of 75 pico curies per liter and then decreased. Beta levels have remained well below the Public Health Service Drinking Water Standard of 1,000 pc/l or $\mu\mu$c/l (26).

Alpha levels reflect largely the activity added by uranium and thorium daughters. The waters of the United States can be characterized in a general way with respect to gross alpha radioactivity content. Gross alpha levels average less than 1 pc/l in east coast, Appalachian, Great Lakes, and Pacific Northwest States. On the Colorado Plateau, and along the eastern slope of the Rocky Mountains, natural radioactivity, principally from mineral deposits, results in average concentrations of about 20 pc/l.

Gross levels are most informative in ascertaining long-term trends or changes in water quality. By themselves, however, they are of limited value in assessing radiation exposure. Where gross results are consistently over the maximum permissible concentrations for mixed fission products, the identity of the specific radionuclides involved must be established.

Because of its significance in the environment, the concentration of strontium 90 in the total solids is also reported. In water year 1963, strontium 90 levels ranged from 0.4 to 11.3 pc/l. The national average reached a high of 3.8 pc/l during the fourth quarter (July, August, September 1963). Highest levels were in the north-central area of the coterminous United States where the average was approximately 6 pc/l for this quarter. All averages were less than the limit (10 pc/l) specified in the Public Health Service Drinking Water Standards (26). The levels of strontium 90 activity in waters of the United States since the first quarter of the 1959 calendar year are presented graphically in figure 2.

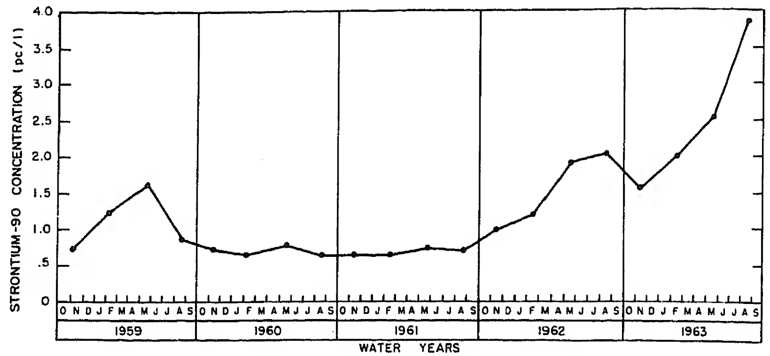


FIGURE 2. STRONTIUM-90 IN SURFACE WATER OF THE UNITED STATES.

Plankton Populations

Geographical distribution of algae and other planktonic organisms are influenced by geologic and climatic factors, and result in distinctive plankton populations in different areas. Within each region, population changes are directly related to temperature, and the nature and concentration of organic and mineral substances which enter the aquatic environment. These substances may come from domestic sewage, industrial wastes, runoff from agricultural lands, irrigation discharges, or native rocks and soils. They may be basic nutrients, highly toxic, or metabolically inert. Planktonic organisms differ greatly in their sensitivity to the nutrient and toxic substances which are present. Some thrive only in water which is relatively free of nutrients while others multiply rapidly in water which has been greatly enriched. Large numbers of tolerant algae usually develop in waters containing abundant supplies of inorganic nitrogen and phosphorus resulting from the mineralization of domestic sewage. These nuisance populations may clog filters in municipal water plants, and produce objectional tastes and odors.

On the other hand, plankton populations may be eradicated by the introduction of toxic organic or mineral wastes. This is not desirable because some plankton organisms play essential roles in providing food and oxygen for higher forms of aquatic life, and in cleansing polluted waters.

Beginning at low nutrient levels, progressive enrichment of waters results in an increase in the variety and abundance of the plankton. However, as higher levels of enrichment are attained, the increase in total numbers of organisms is accompanied by a decrease in the number of kinds of organisms. This change is typical in populations which have been subjected to the wide spectrum of substances being introduced into

surface water in ever increasing amounts. Plankton counts, which provide information concerning the variety and abundance of organisms, are useful in detecting changes in the concentration of organic and mineral substances which enter water supplies.

METHODS OF ANALYSIS

Plankton samples are collected semimonthly at each station. A sample consists of 3 liters of raw water taken directly from the stream or from a treatment plant intake. Preservation is effected at the time of collection by the use of 30 ppm merthiolate.

Three types of analyses are performed:

1. Rotifers, crustacea, and other micro invertebrates are removed from a 1-liter aliquot of the sample by settling 24 hours. The sediment is placed in a special slide, 80 x 50 x 2 mm., and the organisms are enumerated under a compound microscope at 100× magnification. The counts are reported as organisms per liter.

2. A "total live algae" count is obtained from 1 milliliter of the sample by scanning two 50-mm. strips on a Sedgwick-Rafter slide using 200× magnification and a Whipple micrometer disc. An appropriate correction factor is used to convert the counts to units per milliliter. Each single cell or natural aggregate of cells (colony) occupying up to 300 square microns (μ^2) is counted as 1 unit. Large colonies are enumerated according to a modified areal-unit method in which aggregates occupying 300–1,000μ^2 are counted as 2 units, those occupying 1,000–2,500μ^2 as 3 units, those 2500–5000μ^2 as 4 units, and those over 5,000μ^2 as 5 units. About 95 percent of cell aggregates fall into size 1 or 2.

3. Identification and proportional census of diatom species are done from sediment obtained by settling 1 liter of the sample 48 hours. A small aliquot of the sediment is placed on a No. 1 coverglass and dried on a warming table. The sediment is ashed on the coverglass by heating on a hotplate, and permanent slides are made with hyrax mounting medium. Counts are made with 90× apochromatic oil immersion objectives and 10× oculars containing a Whipple micrometer disc. Random strip counts are made until the total number of units reaches 200 to 300. The same areal units are used as described for Sedgwick-Rafter counting.

Organic Chemicals

The Nation's water resources continue to receive increasing quantities of organic contaminants. Since 1940 the chemical industry, particularly in the manufacture of synthetic and petrochemicals, has experienced an enormous expansion that shows every sign of continuing. Each year millions of pounds of synthetic detergents, insecticides, herbicides, and similar domestic products find their way into our streams from household sewers, industrial waste discharges, and land runoff.

Effective and economical treatment methods for most of the complex organic materials remain to be developed. Even where treatment exists, residues may remain in sufficient quantity to cause water damage. These stable residues persist through sewage treatment, biological and chemical action of the stream, and water treatment processes, and finally reach the consumer in drinking water.

The presence of some of these materials, even at concentrations considerably less than 1 part per million, may impair water quality, most noticably in production of tastes and odors. Fishflesh tainting, also quickly noticed by the consumer, is another damage. Effects on water treatment, many of which are ill-defined at present, and impairment of water quality for industrial uses are being reported with increasing frequency. Essentially nothing is known of the possible immediate or long-term effects of these materials on human health. Such information is urgently needed.

The usual sanitary analyses are not effective in measuring these newer organic contaminants. Yet it is essential to know something of their concentrations and character. A method known as the "Carbon Adsorption Technique," developed by the Public Health Service, permits the concentration of these organic compounds from a large volume of water. Elution of the adsorbed materials with organic solvents, followed by chemical separation and testing, provides useful information concerning organic pollution and for assaying river systems for these substances.

Following continuous flow of about 5,000 gallons of water through the carbon adsorption column over a 7- to 10-day period at 0.5 gpm, material on the carbon adsorption column is extracted with two solvents, chloroform and alcohol. The residues are weighed. The concentration of these materials in the water sampled is then computed. See Explanation of Analytical Data, page 21.

CHLOROFORM EXTRACTS

The organic residue recovered from the carbon adsorption column by chloroform is very complex. It is desirable to separate the crude extract into certain broad chemical classes, and this can be done on the basis of solubility differences. The various classes or groups and their general significance are discussed briefly below.

Ether Insolubles

This group is usually a brown, humuslike powder, apparently composed to a large extent of carboxylic acids, ketones, and alcohols of complicated structure. Origin of the group, which is an indicator of "old" pollution, is believed to be partially oxidized sewage and industrial wastes. For example, the Ohio River at Cincinnati has been exposed to much industrial and sewage pollution, and hence large amounts of ether insoluble materials are found. Streams with little or no pollution history have little or no ether insolubles. Chloroform extracts contain from 0 to 30 percent of ether insoluble material.

Water Solubles

These substances are largely acidic and undistillable at moderate temperatures, but their solubility in ether indicates that the molecules are smaller and probably simpler than the ether-solubles. On the other hand, their water solubility practically requires the presence of several functional groups, such as hydroxy-acid, keto-acid, and keto-alcohol. Such compounds probably originate from partial oxidation of hydrocarbons or they may be natural substances. They have very little odor. These materials usually make up 10 to 20 percent of the total extract.

Weak Acids

This group is characterized by being removed from ether solution with sodium hydroxide but not with sodium bicarbonate. Phenols are the best known weak acids, and if present in the water, appear in this group. Other weakly acidic compounds include certain enols, imides, sulfonamides, and some sulfur compounds. This group of materials also occurs in nature. The weak acids are odorous, and commonly constitute 5 to 20 percent of the chloroform extract.

Strong Acids

These acids are usually carboxylic acids such as acetic, benzoic, salicylic or butyric. Although classified as strong in reference to carbonic acid, they are actually weak when compared with a mineral acid, such as sulfuric. Many of the compounds are used industrially, but may also be produced by natural processes, such as fermentation. Some of the materials are highly odorous. This fraction makes up from 5 to 20 percent of the total. The significance of the strong acids can be interpreted only in the light of stream pollution conditions.

Bases

These compounds are organic amines. Such materials as aniline and pyridine are amines of commerce. Lower amines may occur as a result of decomposition. Although odorous, the low concentrations found are not likely to cause objectionable conditions. However, in the case of specific amine-containing wastes the compounds can be of considerable significance. Generally, only 1 or 2 percent of the total extract is made up of the bases.

Neutrals

This group frequently constitutes the major portion of the chloroform extract. Neither basic nor acidic, the materials are less reactive and tend to persist in streams longer than many other types. Hydrocarbons, aldehydes, ketones, esters, and ethers are examples of neutral materials. The group lends itself to further fractionation by means of chromatographic separation into aliphatic, aromatic, and oxygenated subgroups:

Aliphatics: This portion represents petroleum type hydrocarbons in a considerable state of purity, and is usually made up of mineral oil type of material. The percentage of aliphatics present yields important information about the possible source of pollution, since petroleum is the most likely source.

Aromatics: These are principally the coal tar hydrocarbons such as benzene, toluene, and a host of others, and their presence in any significant amount is a reliable indication of industrial pollution. Further, the materials can frequently be identified by infrared spectrophotometry. Some aromatic compounds which have been found in our rivers—and in our drinking water—include DDT, aldrin, endrin, dieldrin, phyenyl ether, orthonitrochlorobenzene, pyridine, phenol, and others. The materials are highly odorous, and may also be toxic. Their appearance in any quantity as pollutants should receive careful evaluation.

Oxygenated compounds (Oxys): These are the neutral compounds containing oxygen, such as aldehydes, ketones, and esters. They may have originated by direct discharge or may represent oxidation products from both natural and industrial materials. They help to indicate the "age" of the pollution, since pollution exposed to oxidation forces for a long time would be expected to contain large amounts of oxys. The oxy materials are odorous.

Losses

Manipulative losses inherent in this type of separation may amount to 10 to 15 percent. Losses greater than this may indicate that volatile components were lost from the sample. Such volatiles may have significance as pollutants.

ALCOHOL EXTRACTS

The alcohol extractables generally consist of materials more polar than the chloroform extractables. They often contain synthetic detergents, carboxylic acids and humic materials which may originate naturally or from oxidized products of domestic and industrial wastes. These classes of substances are not quantitatively recovered by the alcohol extraction. For example, this extraction recovers only 20 to 30 percent of the synthetic detergents present. On waters of mixed industrial and domestic pollution, the chloroform and alcohol extractables may be about equal. On some streams where the industrial pollution is rather low and much natural pollution or sewage is present, the alcohol extractables may exceed the chloroform extractables by a factor of 4 to 6.

The alcohol extract is usually only partially soluble in water and most ordinary solvents. Very little further chemical separation of this material is currently practical. However, tests have revealed that synthetic detergents may make up 1 to 12 percent of the alcohol extract.

OTHER TESTS

Infrared spectra are routinely run on the total chloroform and alcohol extracts as well as the neutral, aliphatic, aromatic and oxygenated groups which are usually the most significant. Spectra of other groups are obtained when there is an indication that they may be significant. These spectra reveal something of the chemical structure of the materials, indicate differences and in certain instances provide a definite identification. In the case of the alcohol extracts, the infrared spectra will indicate the presence of synthetic detergents if the materials constitute a significant portion.

Thin layer chromatography has been applied successfully to the resolution of the aromatic and basic fractions of CCE. Gas chromatographic equipment with flame ionization, electron-capture and microcoulometric detectors have also been used freely in the identification of specific substances.

COMPOSITE ANALYSIS

Samples from certain locations have been selected for analysis on a quarterly composite basis. Stations that have collected at least 12 samples in a nearly consecutive manner and averaged 100 ppb. or less of chloroform extractables are selected for such analysis when certain other conditions are met. However, samples falling in this category are analyzed individually when the recovery of the chloroform extract is exceptionally high and/or it is unusual in its infrared spectrum or some other physical characteristic.

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SPECIFIC IDENTIFICATIONS

Information about specific organic substances which were identified in carbon adsorption samples is given on the second page of the group associated with each station. The increased number of pesticide and other specific compounds identified, as compared to previous years, is partly associated with greater sensitivity in analytical methodology and may be partly a reflection of the increasing usage of these substances in the total environment.

Chemical, Physical, and Bacteriological Examinations

The various biochemical, chemical, physical, and bacteriological examinations generally performed by the participating laboratories are discussed below.

AMMONIA NITROGEN AND CHLORINE DEMAND

The cost of water treatment for domestic use is affected by the consumption of chlorine, with ammonia nitrogen being responsible for a large portion of the chlorine demand. The greater this demand, the more expensive is the treatment. The ammonia may originate from unstabilized domestic pollution, from industrial waste discharges, from run-off containing fertilizers used in farming operations or from all three. The presence of measurable quantities of nitrogen compounds, not necessarily ammonia, is also an indication of the fertility of the stream toward both macro- and micro-biological forms.

COLOR

Color in domestic water supplies is undesirable. Its removal in the water treatment process, whether it be from natural or industrial sources, may require large doses of chemicals and be expensive.

DISSOLVED OXYGEN, BIOCHEMICAL AND CHEMICAL OXYGEN DEMANDS

Biochemical processes, in which aquatic organisms attack and stabilize the organic matter present, require dissolved oxygen. If unstable oxidizable organic matter is present in excess, the organisms will multiply rapidly, consuming the oxygen present in the water, and bring about a foul, septic stream condition. The dissolved oxygen level thus serves to indicate the biochemical activity of the stream. High activity, resulting in low dissolved oxygen levels, will drive out game fish in favor of scavengers. Very low or zero oxygen levels will kill all fish and aquatic organisms dependent on dissolved oxygen for life. Temperature and reaeration rates also affect dissolved oxygen levels.

The 5-day biochemical oxygen demand (BOD) indicates the degree of unstabilized organic pollution from either domestic or industrial sources, to which the stream is being subjected. A significant demand will affect the fish and macroorganism population, and waters carrying a high BOD seldom contain game fish. On the other hand, game fish will thrive in streams in which the oxygen demand has been stabilized, as this condition is usually favorable for the growth of organisms on which fish feed.

The chemical oxygen demand analysis serves to support the findings of the biochemical oxygen demand test. It too may indicate to what extent the waste load of the stream has been stabilized, or it may indicate the presence of organic and inorganic pollution which is not readily oxidized by biological processes. Because the chemical oxygen demand can be determined quickly in comparison to the biochemical oxygen demand, the establishment of a correlation between the two parameters serves to reduce the number of the latter determinations required. The chemical demand results are nearly always higher than the biochemical demand.

TEMPERATURE

Temperature is particularly important to conservation and industry. A few degrees elevation in temperature due to cooling water discharges may seriously limit the capacity of a stream to support fish life. Also, high water temperatures increase the cost of cooling water for

industrial operations. Cooling towers and other equipment for handling cooling water must be engineered to the temperature levels normally encountered.

MINERAL CONSTITUENTS

These determinations include alkalinity, hydrogen-ion concentrations (pH), hardness, chlorides, sulfates, and total dissolved solids. The pH indicates whether water is acidic or alkaline, corrosive or passive. Alkalinity is a measure of the neutralization reserve present, or the extent to which the water can resist a change from an alkaline to an acid condition upon addition of acidic chemicals. This information is important to the water treatment plant operator and to many other water users.

Hardness is not only a measure of the soap consuming property, but is also of importance in the treatment of boiler waters, where removal of hardness is one of the most important functions. Chloride, sulfate, and total dissolved solids add further information on the gross dissolved mineral content carried by the stream. These are of great importance when considering the taste or palatability of water. They are also important when the water is being demineralized for specific industrial processes, since the cost of demineralization is a direct function of the dissolved solids content of the water. In addition, waters of high saline content are less desirable and may at times even be unfit for municipal, irrigation, and other uses.

TURBIDITY

Turbidity of water is due to the suspension of clay, silt, finely divided organic matter, microscopic organisms, and other similar materials. Its presence is of particular importance in water treatment processes and in the propagation of fish and other aquatic life.

COLIFORM ORGANISMS

Information about fecal pollution is essential to water quality measurements. Data on coliform bacteria, used as indicators of pollution, help to point up the trends in the effectiveness of treatment of domestic waste discharges.

The delayed-incubation membrane filter technique is used for the coliform examination, instead of the fermentation tube (MPN) method. The latter necessitates transport of water samples to the Water Quality Section laboratory for examination, with a time lapse between collection and examination that can significantly change their microbial content. Also, some of the many other bacteria present in raw water might overgrow or otherwise inhibit the demonstration of the coliform organisms. In the delayed-incubation membrane filter procedure, the bacteria are filtered out from the fluid samples immediately after collection and the filters sent to the Water Quality Section laboratory on a preservative medium. In the laboratory the membrane filters carrying the bacteria are transferred to a medium selective for coliform organisms, then incubated and counted. The resulting counts approach very closely the actual numbers of coliform bacteria present in the water samples at the time of collection.

Unusual populations of coliform bacteria may mean increased pollution and ensuing loss of water quality. The Public Health Service Water Pollution Surveillance System studies and reports the trends in sewage pollution on streams as indicated by the trends of coliform counts.

Trace Elements and Other Determinations

This year's trace element data differ somewhat from data reported in previous compilations in that the manner of obtaining the data has been modified and the program of elements measured altered. The trace metals measurements are now obtained from a 3.4 meter direct reading spectrograph. Tin, antimony, and bismuth have been discontinued; arsenic, boron, phosphorus, aluminum, and strontium have been added. Increased sensitivity for several elements has been attained, especially zinc, manganese, and beryllium, resulting in fewer indeterminate values.

Twice during the year, 3-month composites of the weekly samples were prepared and subjected to analysis. Examinations covered those elements included in the Public Health Service Drinking Water Standards (26), and other metals considered to have possible physiological or

toxicological significance. The ultimate goal of this phase of the program is to provide background data on all elements which may be found in water and which may be of significance in water quality management.

In carrying out the spectrographic examination, the sample is first passed through a membrane filter, .045 micron pore size, to remove all suspended matter. An aliquot of sample is then acidified with redistilled nitric acid and evaporated to a concentration containing 100 mg. of dissolved solids in 5.0 ml. A portion of the prepared sample is placed in a porcelain boat and sparked using a rotating disc, with concentrations of the 19 programed elements measured on the direct reader (*12*).

Waters of low dissolved solids content can be concentrated to a greater degree than those having a high dissolved solids content, thus accounting for the variable sensitivity shown in the tabulations. Values followed by an asterisk (*) show the limits of sensitivity at which the test was performed and indicate that the ion being measured was not detected at that level.

It is known that trace concentrations of some ions are subject to precipitation and adsorption on container surfaces during storage. This applies particularly to iron and manganese which are subject to oxidation. Hence, all the values reported by the spectrographic method represent the quantity of metal in solution at the time of analysis to within about 10 percent.

The measurement of sodium and potassium is performed using a flame procedure. Fluoride is determined with the SPADNS reagent using the method described by Bellack and Schouboe (*3*). Boron, previously measured by the curcumin procedure, is now reported from the spectrograph. Measurement of selenium has been eliminated due to the general absence of this element from the samples examined.

The concentrations of surface active agents, reported as alkyl benzene sulfonate (ABS), in the Nation's surface waters is reported for the first time on a number of selected stations. As the capability of determining this pollutant increases, efforts will be made to include all sampling points in the Surveillance System. The data presented here were obtained using a modification of the Standard Methods methylene blue procedure on an automatic analyzer.

The Benthos

Animals and plants that live in or on the bottom substrata of lakes and streams are known as the benthos. This biological community includes such common animals as immature insects, worms, clams, snails, and crustacea. The benthic populations found on a stream bottom are largely determined by the type of substrate. Bottoms consisting of soft silty sediments are normally inhabited by animals that are able to burrow into the sediments and feed on organic detritus in the sediments. These include worms, clams, and certain insect larvae. The number of species is usually small in these habitats. Shallow streams with shoals, rapids, and riffles have more available niches for animals to occupy and the normal benthic fauna usually includes a large variety of organisms.

The benthic populations provide a basic indicator of general water quality. Whereas the plankton organisms move downstream with the current, and fish are able to migrate considerable distances, the benthos is a population relatively fixed on the bottom and the animals are subject to the water flowing over them. The benthic populations will therefore be influenced by the quality of the water.

The animals that make up the benthos have various life cycles. Insects may exist as aquatic larvae living in the bottom for as long as 2 years. They then emerge as adults and mate. The female deposits fertilized eggs into the stream. Some of the class produce young which attach themselves to fish. Some of the worms reproduce asexually. An analysis of the age structure of certain forms in the benthos may provide information on past conditions of the water.

Under conditions of good water quality the benthos should include a variety of species with no one species being present in excessive numbers. If the water should become degraded, certain species in the population, intolerant of the changed environment, will die out; and as the water quality deteriorates, increased numbers of species in the benthos will be eliminated. The one or more species that survive may be able to develop very large populations. Toxic materials in the water or deposited on the bottom may effectively eliminate all bottom life.

At each station where bottom samples are taken an attempt is made to find areas of suitable substrate. From these areas, where pos-

sible, a series of at least six quantitative samples is taken by means of suitable dredges or samplers. In riffles the Surber squarefoot sampler is used. In deep rivers the Ekman or Peterson dredge is used (see Standard Methods, for the Examination of Water and Wastewater, 11th edition, pp. 572–582) (22). A general qualitative collection of invertebrate life is usually made at all stations.

The bottom materials are screened in the field using a screen with 28 meshes to the inch. The concentrated sample is preserved in alcohol and returned to the laboratory.

In the laboratory the sample is transferred to pans and the macroscopic organisms are separated from the sediment and detritus. The animals are then identified as near to species as possible, enumerated, and weighed. Specimens are preserved and retained for future reference.

During this year benthos data were gathered for stations in the Ohio and Tennessee River basins only and are presented with the descriptive material for the appropriate stations. A supplemental analysis of these data will be published separately.

Fish Populations

Fish are a biological end product of the aquatic environment. They are an important source of food, and sport fishing is one of our leading forms of recreation. The maintenance of fish life has been recognized by the Congress, and by States which have protective pollution control legislation, as an important and legitimate use of our Nation's waterways. In other words, in measuring fish populations at Surveillance System stations, we are not measuring a parameter that affects a water use as in the case of other measurements presented in this compilation, but rather a unique parameter that is in itself considered a beneficial water use.

The water quality requirements and tolerance of aquatic life to different types of contaminants vary tremendously. It is this variability in response which makes living aquatic organisms usable indicators of environmental disturbance. Fish require water relatively high in dissolved oxygen, and are intolerant of many chemical and physical contaminants resulting from agricultural, industrial and mining practices. However, the tolerance of different species varies, and man-induced changes of the environment often affect one species more than another, producing imbalanced populations which quite often favor the species less desirable economically.

Moderate amounts of putrescible wastes may enrich the habitat, resulting in great increases in standing crops of fish present. However, under such conditions, the more tolerant and adaptable species may comprise a disproportionate share of the total population, and very sensitive species may be eliminated altogether. The effect of toxic wastes may vary from complete elimination of populations to a reduction in reproductive capacity, growth and resistance to disease and parasitism.

Fish kills are a spectacular and obvious indication that an abrupt change has taken place in the environment. However, because of high mobility resulting in rapid recruitment, the fish population in a river or stream may return to normal levels within a very short time after a kill.

Chronic pollution, to which the fish population must adjust over a period of time, will be reflected in the kinds and relative abundance of the fish species present. In addition to the species composition, the condition of the fish, their growth, reproductive success and certainly their palatability are factors of considerable importance in evaluating the suitability of a body of water for supporting usable stocks of fish.

During the current water year, data on fish populations were gathered for some stations in the Ohio and Tennessee River basins only, and are presented in tables in volume 5 for the appropriate stations.

Fish samples at these stations were collected primarily with rotenone and with an electrofishing device. Five percent emulsified rotenone was applied at suitable sites, where an area of 1 to 3 acres could be blocked off with nets during the rotenoning operation. Such sites were usually in the form of small coves along the shoreline, the mouths of small tributaries, or behind the partial enclosure created by navigational lock walls. An electrical shocking device was used along the shoreline both during the day and at night. In a few cases, samples were also collected with trammel nets and with short, 25-foot haul seines. Sampling with nets and seines was limited because of the paucity of habitat in large rivers which is suitable for using these types of gear.

With each method used sufficient sampling was done to collect as many species present as possible, and to obtain a measure of the relative abundance and size distribution of the various species. Every type of fishing gear is somewhat selective, and the data obtained may not be representative of the actual population composition present in the river at the time of sampling. However, the data obtained by a given method are quantitatively comparable and may be used to evaluate changes in the population composition resulting from natural and man-induced changes in the habitat. Comparisons should be based on samples collected with the same gear, during the same season of the year, and under similar conditions of stream flow and water temperature. These data will be particularly useful in determining the impact of changes in water quality on the fish populations of the Nation's rivers over long periods of time.

For convenience of comparison, the fish in the tables are grouped into six major categories based on food habits and methods of feeding:

I. Large, sight feeding carnivores that feed on other fish. This group includes most game species.

II. Species that feed primarily on insects. This group provides important forage for species in group I.

III. Species that feed primarily on plankton and algae. These also provide important forage for group I species.

IV. Species that feed primarily on mollusks.

V. Omnivores that feed indiscriminately on plant and animal matter from the bottom.

VI. Scavengers that take any available food. Some of the species in this group may sometimes act as predators. The group also includes many important food fish, and species that are tolerant of degraded conditions.

Because foods and feeding habits vary with size, age, and availability of food, there may be considerable overlap between groups. The species listed were grouped according to available literature regarding the main foods of adult specimens of each species.

In the field the total length of the fish was routinely measured to the nearest inch class on a one-half inch interval. Thus a fish in the 5-inch class would measure from 4.5 inches to slightly under 5.5 inches. If the end of the tail touched the dividing line between two length classes, the fish was included in the higher classification. The percent total number and weight are carried to the nearest one-tenth of 1 percent in the tables. The one-tenth of 1 percent was arbitrarily selected for purposes of tabulation, and does not imply such a high level of sampling accuracy.

The fish are listed by common names in the tables according to American Fisheries Society Special Publication No. 2 (1960), A List of the Common and Scientific Names of Fishes From the United States and Canada, Second edition (*1*).

Stream Flow

Stream flow data have a most important role in the utilization of water quality parameters such as are included in this report. For this reason, average daily flow records are reported for most of the sampling stations in the System.

All flow data included in this compilation are *provisional* data furnished by the agencies credited, and are subject to revision by such agencies prior to any final publication. With the exceptions mentioned, the flows are given as furnished to the Public Health Service.

The data were generally furnished in units of cubic feet per second. In general only the first three digits were considered significant. Because of machine limitations the data are reported here in thousand cubic feet per second. Even though three zeros may appear after the decimal, no artificial accuracy of measurement is implied. Only the first three digits should be considered significant. There are two exceptions:

(1) When the flow was over 1 million cubic feet per second, the first four digits are reported, and (2) at times when the Rio Grande flows were extremely low, the data were reported to tenths of a cubic foot per second. These figures are published showing 4 decimal places.

Flow data for sampling stations on the rivers of the Great Lakes system are reported as the monthly mean flow, as computed by the U.S. Lake Survey. In certain other rivers, flow data were computed by the Public Health Service from information supplied by the gaging agency. The methods of computations are shown as footnotes to the data for the applicable stations.

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Explanation of Analytical Data

RADIOACTIVITY DETERMINATIONS

In evaluating radioactivity data it should be noted that the reported errors represent counting errors only and the reported values are subject to other errors commonly associated with gross radioactivity analysis. (See Reference 22.)

A dash (—) in the count column signifies that no determination was made. An asterisk (*) following date of sample indicates that determinations are for composites of two or more samples taken on and before the date shown.

Strontium 90 determinations are reported in micro-microcuries per liter as measured from total solids in the sample composited for the quarter. A dash (—) indicates that no determination was made in that period.

PLANKTON POPULATION

Plankton data are reported on two pages. The first page lists the population size of various groups of algae. A coded number shows the ten most abundant genera of algae and their count level. Code numbers used are identified on page 18. Blank spaces on the data sheets signify that counts of other genera were below a level of 150 per ml. The second page of plankton data lists the four dominant diatom species and their occurrence as a percent of the total diatom population. The percent of occurrence of all other diatom species is shown in the next column. Identification codes of species are given on page 19.

The detectable numbers per ml. of fungi, sheathed bacteria and protozoa are shown in the next two columns. The rotifer and crustacea totals per liter are listed together with the genera where these occurred at a count level of five or more per liter for rotifers and three or more per liter for crustacea. Nematode and miscellaneous animal form counts per liter appear in the last two columns.

A dash (—) indicates that no analysis was made. A zero count of each group is indicated by "0". Blank spaces under abundance and dominance columns indicate that the populations were too few to be included or were absent. Coding for abundant genera of rotifer and crustacea population levels are presented on page 20.

PLANKTON POPULATION

Identification Codes of Algae Genera and Count Levels of Most Abundant Genera

KEY TO COUNT LEVEL (per ml.)

1 150 to 300
2 301 to 600
3 601 to 1,200
4 1,201 to 2,400
5 2,401 to 4,800
6 4,801 to 9,600
7 9,601 to 19,200
8 19,201 to 38,400
9 38,401 and over

Code to ALGAE GENERA (Producers)

Blue-green Algae

01 Agmenellum (Merismopedia)
02 Anacystis (Microcystis)
03 Anacystis
04 Coccochloris
05 Gomphosphaeria
06, 07, 08 Reserve
09 Other genus
10 Other genus

Filamentous blue-greens

11 Anabaena
12 Aphanizomenon
13 Arthrospira
14 Lyngbya
15 Oscillatoria
16 Phormidium
17 Raphidiopsis
18 Spirulina
19, 20, 21 Reserve
22 Other genus
23 Other genus

Coccoid green algae

24 Actinastrum
25 Ankistrodesmus
26 Chlorella-type
27 Chlorococcum
28 Closterium
29 Coelastrum
30 Crucigenia
31 Dictyosphaerium
32 Golenkinia
33 Lagerheimia
34 Micractinium
35 Oocystis
36 Palmellococcus
37 Pediastrum
38 Scenedesmus
39 Staurastrum
40 Tetradesmus
41 Tetrastrum
42, 43 Reserve
44 Other genus
45 Other genus

Filamentous green algae

46 Cladophora
47 Stichococcus
48 Stigeoclonium
49 Reserve
50 Other genus

Green flagellates

51 Chlamydomonas including Carteria
52 Euglena
53 Lepocinclis
54 Pandorina
55 Phacotus
56 Phacus
57 Trachelomonas
58 Reserve
59 Other genus

Other pigmented flagellates

60 Chromulina
61 Dinobryon
62 Gymnodinium
63 Peridinium
64 Reserve
65 Other genus

Diatoms (with chromatophores)

Centric

66 Biddulphia
67 Coscinodiscus
68 Cyclotella
69 Melosira
70 Rhizosolenia
71 Stephanodiscus
72 Other genus

Pennate

73 Achnanthes
74 Amphiprora
75 Amphora
76 Anomoeoneis
77 Asterionella
78 Caloneis
79 Cocconeis
80 Cymatopleura
81 Cymbella
82 Diatoma
83 Diploneis
84 Fragilaria
85 Gomphonema
86 Gyrosigma
87 Navicula
88 Nitzschia
89 Pleurosigma
90 Rhoicosphenia
91 Surirella
92 Synedra
93 Tabellaria
94, 95, 96 Reserve
97 Other genus
98 Other genus
99 Other genus

PLANKTON POPULATION
Identification Code for Diatom Species

No.	Species	No.	Species	No.	Species
01	Achnanthes lanceolata	35	Diatoma elongatum	69	Nitzschia denticula
02	Achnanthes minutissima	36	Diatoma vulgare	70	Nitzschia (Lancelolatae group)
03	Achnanthes sp.	37	Diatoma sp.	71	Nitzschia sp. (first)
04	Amphiprora paludosa	38	Diploneis smithii	72	Nitzschia sp. (second)
05	Amphiprora sp.	39	Diploneis sp.	73	Opephora martyi
06	Amphora ovalis	40	Epithemia turgida	74	Pinnularia sp.
07	Amphora sp.	41	Epithemia sorex	75	Pleurosigma delicatulum
08	Anomoeoneis exilis	42	Epithemia sp.	76	Rhoicosphenia curvata
09	Asterionella formosa	43	Eunotia sp. (first)	77	Rhizosolenia eriensis
10	Bacillaria paradoxa	44	Eunotia sp. (second)	78	Rhopalodia gibba
11	Biddulphia laevis	45	Fragilaria capucina	79	Rhopalodia sp.
12	Caloneis amphisbaena	46	Fragilaria construens	80	Stephanodiscus astraea var. minutula
13	Caloneis sp.	47	Fragilaria crotonensis	81	Stephanodiscus dubius
14	Ceratoneis arcus	48	Fragilaria pinnata	82	Stephanodiscus hantzschii
15	Cocconeis pediculus	49	Fragilaria sp.	83	Stephanodiscus niagarae
16	Cocconeis placentula	50	Frustulia sp.	84	Stephanodiscus sp.
17	Cocconeis sp.	51	Gomphonema olivaceum	85	Surirella brightwelli
18	Coscinodiscus rothii	52	Gomphonema sp.	86	Surirella ovata
19	Coscinodiscus (brackish)	53	Gyrosigma kutzingii	87	Surirella striatula
20	Coscinodiscus sp.	54	Gyrosigma sp.	88	Surirella sp.
21	Cymatopleura solea	55	Hantzchia amphioxys	89	Synedra acus
22	Cymatosira belgica	56	Melosira ambigua	90	Synedra pulchella
23	Cyclotella atomus	57	Melosira distans var. alpigena	91	Synedra nana
24	Cyclotella comta	58	Melosira granulata	92	Synedra ulna
25	Cyclotella kutzingiana	59	Melosira binderana	93	Synedra vaucheriae
26	Cyclotella meneghiniana	60	Melosira islandica	94	Synedra sp.
27	Cyclotella pseudostelligera	61	Melosira italica	95	Tabellaria fenestrata
28	Cyclotella stelligera	62	Melosira varians	96	Tabellaria flocculosa
29	Cyclotella striata	63	Meridion circulare	97	Any entity not found above (first)
30	Cyclotella sp.	64	Navicula cryptocephala	98	Any entity not found above (second)
31	Cymbella ventricosa	65	Navicula sp. (first)	99	Reserved for future entity
32	Cymbella tumida	66	Navicula sp. (second)	xx	Insignificant or population inadequate
33	Cymbella sp.	67	Nitzschia acicularis		
34	Denticula sp.	68	Nitzschia tryblionella		

PLANKTON POPULATION

Identification Codes of Microinvertebrate Genera and Count Levels of Most Abundant Genera

Genera of ROTIFERS
Key to counts per liter

1	5 to 10
2	11 to 20
3	21 to 40
4	41 to 80
5	81 to 160
6	161 to 320
7	321 to 640
8	641 to 1,680
9	1,681 and over

Genera of CRUSTACEA
Key to counts per liter

1	3 to 5
2	6 to 10
3	11 to 20
4	21 to 40
5	41 and over

Code to MICROINVERTEBRATES

Rotifers

01	Asplanchna
02	Brachionus (also Platyias)
03	Collotheca
04	Cephalodella
05	Chromogaster
06	Euchlanis
07	Filinia
08	Gastropus
09	Hexarthra (also Pedalia)
10	Kellicottia
11	Keratella
12	Lepadella
13	Monostyla (also Lecane)
14	Notholca
15	Philodina and similar contracted bdelloids
16	Ploesoma
17	Polyarthra
18	Pompholyx
19	Proales
20	Rotaria
21	Synchaeta
22	Trichocerca
23	to 45 Reserve
46	Other genus
47	Other genus
48	Other genus
49	Other genus

Cladocerans

50	Nauplii
51	Bosmina and related genera
52	Daphnia and related genera
53	Moina
54	Polyphemus
55	to 72 Reserve
73	Other genus
74	Other genus
75	Other genus

Copepods

76	Cyclops,Euclops, and Paracyclops
77	Diaptomus
78	to 97 Reserve
98	Other genus
99	Other genus

Blank—Insignificant or population inadequate

ORGANIC CHEMICALS

Although units of concentration may be assigned to the values reported herein (µg/l or parts per billion), it is essential that the user of these data consider additional associated information. Introspective examination of the data reported herein has indicated that comparison of concentration values obtained from samples of similar gallonage are more valid than samples of widely differing gallonage. In addition, recent experimental researches have shown that lower flow rates and lower sample volumes than those employed (5,000 gallons at 0.5 gpm) are substantially more efficient and should produce relatively higher concentration values with this method. The first in a series of changes designed to increase sampling efficiency is already underway at Water Pollution Surveillance System stations.

Concentration values reported for specific substances are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE. In light of an unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.

Zeros when reported have been entered. A dash indicates that the respective results were not reported. An asterisk in the column showing end of sample date indicates that the determinations are for composited samples taken on and before the date shown. The extent of compositing can be determined by examining the gallons filtered, which is the sum of the applicable individual samples immediately above it.

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

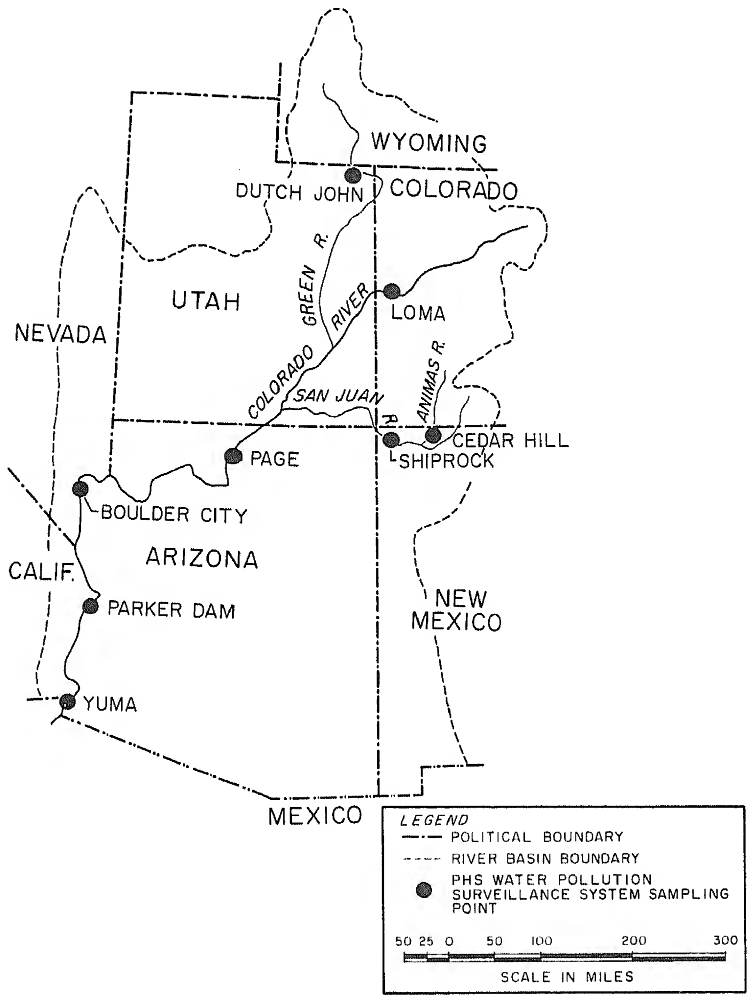
The data entered in each column are as reported. Concentrations of alkalinity and hardness are reported in milligrams per liter as $CaCO_3$. A dash signifies that the particular test was not performed. Zeroes when meaningful have been entered. An asterisk preceding a number should be read as "less than" the number following it.

TRACE ELEMENTS AND OTHER DETERMINATIONS

For a discussion of the sensitivity limits of the determinations performed with spectrographic methods, see page 11.

BASIN 11

COLORADO RIVER



The headwaters of Colorado River are on the west slope of the Rocky Mountains in northern Colorado. This river flows nearly 1,400 miles generally southwesterly to the Gulf of California. Seven States comprise 244,000 square miles of the drainage area and the stream forms the boundary separating Arizona from California and part of Nevada. The river flows exclusively through Mexico with a drainage area of about 2,000 square miles for its last 80 miles.

San Juan-Animas Rivers: The San Juan River is tributary to the Colorado River and the Animas River is tributary to the San Juan. The two rivers begin at altitudes above 10,000 feet and flow over very steep courses in their upper reaches. Most of the flow in these river systems originates in Colorado. Flows through numerous dry washes or arroyos from occasional desert rains carry large sediment loads to the San Juan. Below the confluence of the Animas and the San Juan at Farmington, a broad stream bed is cut into soft sandstones and marls, within which the dry-weather flow channel meanders.

Green River: The Green River is tributary to the Colorado in southeastern Utah. This stream flows from southwestern Wyoming to Utah, and back into Utah where it joins the Colorado below Moab, Utah.

Colorado River: The Colorado River drains an area which is almost entirely arid. Precipitation varies from 2½ inches per year along the Mexican Border to 30 inches per year in the higher elevations along the Continental Divide. Annual evaporation varies from about 32 inches in the upper basin to almost 86 inches in the California-Arizona desert area. The lower Colorado is presently regulated. The dam construction now underway and planned will provide for bringing the entire river under regulation.

There are extensive irrigation and water power projects throughout the river basin. In addition, a portion of the flow of the Colorado is diverted and exported to southern California for municipal and industrial uses. The principal industrial activity in the basin is mining and ore processing. The extent of these activities vary in location and time. Past mining activities have left their scars on the mountains and mine drainage and tailings piles still exert an influence on the quality of the water draining some areas.

The Colorado plateau extends over portions of Utah, Colorado, Arizona, and New Mexico. The lower portion of the plateau is largely composed of flat-lying sandstones, shales, and limestones which have been deeply incised by the river system, most notably in the Grand Canyon. Because of the land erosion, the Colorado River carries a large silt load.

There is a strong dependence of alpha activity upon suspended solids and thus upon regional geological conditions. It has been found that the range of natural alpha activity in this basin is from 0 to 30 picocuries per gram of suspended solids. Occasional increased levels of alpha activity are reported in this volume for a number of individual samples; these are associated with higher suspended solids concentrations.

The chlorinated hydrocarbon pesticides, dieldrin, DDT, and DDD have been identified in carbon adsorption method samples collected from the lower Rio Grande at El Paso, Laredo, and Brownsville.

Maximum algal populations in the basin are generally well below 5,000/milliliter. In most cases the phytoplankton are dominated by pennate diatoms, including *Synedra ulna, S. nana, Diatoma elongatum, D. vulgare, Navicula* spp., and *Surirella ovata.* The more abundant centric diatoms include *Stephanodiscus hantzschii,* and *Cyclotella meneghiniana.* Rotifers and microcrustacea are not abundant.

ANIMAS RIVER AT CEDAR HILL, NEW MEXICO

The Public Health Service Water Pollution Surveillance System sampling station on the Animas River is located near the Colorado-New Mexico State line. Samples are collected from the bank at the gas pipeline crossing on the Heizer ranch.

Two communities in Colorado, Silverton and Durango, discharge raw and treated municipal wastes, respectively, into the Animas. Aztec, New Mexico, fifteen miles below the surveillance station and Farmington, New Mexico, fourteen miles below Aztec, use the river for municipal supply and waste disposal.

The quality of the Animas is affected by uranium mine tailings and drainage near Silverton, Colorado.

Extensive use is made of the stream for irrigation and there are oil and gas developments below this station.

736-500 O - 64 - 3

Station Location: Animas River at Cedar Hill, New Mexico

Major Basin: Colorado River

Minor Basin: San Juan River

Station at: 37°00' Latitude 107°52' Longitude

Miles above mouth: 30

Activation Date: February 1, 1960

Sampled by: San Juan County Health Department

Field Analysis by: San Juan County Health Department; U.S. Public Health Service

Other Cooperating Agencies: New Mexico Department of Public Health

Hydrologic Data:

Nearest pertinent gaging station: Near Cedar Hill, New Mexico

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 1090 square miles

Period of record: 1933 to present

Average discharge in record period: 912 cfs.

Maximum discharge in record period: 13,100 cfs.

Minimum discharge in record period: 90 cfs. (daily)

Remarks: Flows affected by irrigation diversion above station.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/1

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/1	F	.66	.35
	Na	37	8.3
	K	4.3	2.1
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	*8	15
	Cd	*4	1.7
	As	*39	*17
	B	37	21
	P	*10	10
	Fe	29	6
	Mo	*4	10
	Mn	*2	*.9
	Al	—	9
	Be	*.1	*.04
	Cu	*4	2
	Ag	*.8	.4
	Ni	*4	2.6
	Co	*8	*2
	Pb	14	21
	Cr	*2	6
	V	7	*9
	Ba	35	31
	Sr	488	191

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/1	+ -	Composite Interval	pc/1	+ -
October to December	.9	.2	April to June	—	—
January to March	—	—	July to September	1.8	.3

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/1

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/1. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION ANIMAS RIVER AT

CEDAR HILL, NEW MEXICO 56

DATE SAMPLE TAKEN MO.	DAY	YR.	DATE OF DETERMINATION MO.	DAY	RADIOACTIVITY IN WATER: ALPHA SUSPENDED pc/l	±	ALPHA DISSOLVED pc/l	±	ALPHA TOTAL pc/l	±	BETA SUSPENDED pc/l	±	BETA DISSOLVED pc/l	±	BETA TOTAL pc/l	±	RADIOACTIVITY IN PLANKTON: DATE OF DETERMINATION MO.	DAY	GROSS ACTIVITY ALPHA pc/g	±	GROSS ACTIVITY BETA pc/g	±
10	1	62	11	1	1	1	7	3	8	3	9	6	50	9	59	11						
10	8	62	12	14	0	1	1	2	1	2	1	11	12	17	13	20						
10	15	62	11	20	0	1	13	4	13	4	11	12	35	15	46	19						
10	22	62	11	17	2	1	4	2	6	2	1	7	22	9	23	11						
10	29	62	12	24	1	1	3	2	4	2	9	5	14	6	23	9						
11	5	62	11	29	1	1	12	4	13	4	4	10	19	14	23	17						
11	13	62	12	28	1	1	5	3	6	3	15	12	25	15	40	19						
11	19	62	12	6	1	1	7	3	8	3	33	12	114	17	147	21						
11	26	62	12	15	9	10	3	2	12	10	283	68	37	12	320	69						
12	3	62	12	31	4	2	2	2	6	3	43	7	23	9	66	11						
12	10	62	1	4	2	2	4	2	6	2	19	14	17	15	36	21						
12	19	62	1	14	2	1	4	2	6	2	8	3	10	4	18	5						
12	26	62	1	14	2	1	5	3	7	3	20	7	24	8	44	11						
1	2	63	1	18	1	1	6	3	7	3	3	13	25	15	28	20						
1	7	63	1	23	2	2	6	3	8	3	2	13	15	16	17	21						
1	23	63	2	11	1	1	14	5	15	5	7	6	42	9	49	11						
1	30	63	2	14	0	1	4	4	4	4	16	12	39	17	55	21						
2	6	63	3	4	51	20	4	3	55	20	336	44	50	8	386	45						
2	20	63	3	11	5	2	7	3	12	4	14	6	41	8	55	10						
2	27	63	3	15	10	7	2	3	12	8	78	17	40	14	118	22						
3	5	63	3	27	2	1	10	4	12	4	16	13	47	16	63	21						
3	13	63	3	27	3	2	14	4	17	4	46	13	55	17	101	21						
3	20	63	4	4	101	43	12	4	113	43	409	114	69	17	478	114						
3	27	63	4	18	5	7	0	3	5	8	168	27	29	8	197	28						
4	3	63	4	29	1	1	1	1	2	1	52	5	37	4	89	6						
4	10	63	5	6	10	4	1	1	11	4	157	7	33	4	190	8						
4	15	63	5	1	41	13	2	1	43	13	144	27	35	9	179	28						
4	24	63	5	20	0	0	1	1	1	1	9	3	20	4	29	5						
5	1	63	5	20	1	1	3	2	4	2	10	3	26	4	36	5						
5	8	63	5	27	22	10	1	1	23	10	265	22	61	4	326	22						
5	15	63	6	3	0	1	2	1	2	1	25	3	41	4	66	5						
5	22	63	6	7	1	1	0	1	1	1	44	8	45	8	89	11						
5	29	63	7	1	0	0	1	1	1	1	15	3	36	4	51	5						
6	5	63	6	24	0	0	1	1	1	1	16	3	28	4	44	5						
6	12	63	7	10	0	0	1	1	1	1	10	6	27	9	37	11						
6	19	63	7	10	0	0	2	1	2	1	20	6	25	8	45	10						
6	26	63	7	17	0	1	0	1	0	1	6	6	27	8	33	10						
7	3	63	7	17	0	1	3	2	3	2	32	5	9	9	41	10						
7	10	63	8	6	99	48	4	2	103	48	496	121	41	9	537	121						
7	17	63	8	12	0	0	2	2	2	2	5	3	19	4	24	5						

RADIOACTIVITY DETERMINATIONS

STATE NEW MEXICO
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION ANIMAS RIVER AT
CEDAR HILL, NEW MEXICO 56

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
7	24	63	8	12	0	1	3	3	3	3	20	3	26	5	46	6						
7	31	63	8	14	1	1	2	2	3	2	4	6	21	15	25	16						
8	7	63	8	21	12	6	2	2	14	6	46	21	20	15	66	26						
8	14	63	8	27	3	3	2	2	5	4	31	16	17	9	48	18						
8	21	63	9	16	1	1	4	3	5	3	5	3	17	5	22	6						
8	28	63	9	20	17	13	0	1	17	13	115	40	15	6	130	40						
9	4	63	9	20	2	2	0	1	2	2	12	7	8	7	20	10						
9	18	63	10	8	1	1	2	3	3	3	5	6	11	11	16	13						
9	25	63	10	10	0	0	2	2	2	2	1	5	12	8	13	9						

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION ANIMAS RIVER AT CEDAR HILL, NEW MEXICO 56

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES											
BEGINNING			END								NEUTRALS									
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	1	62	10	8	5335	64	21	43	1	6	8	1	1	6	0	2	1	0	3
11	6	62	11	13	4962	81	29	52	1	7	12	1	1	10	0	3	2	1	3
12	4	62	12	10	4247	87	15	72	0	2	9	2	1	6	0	1	1	0	2
4	8	63	4	11	2340	74	23	51	1	6	10	2	1	6	1	2	1	0	3
5	9	63	5	15	3985	59	27	32	1	8	7	1	1	5	0	3	2	0	6
6	7	63	6	12	3636	40	17	23	1	4	7	2	0	5	0	2	1	1	1
7	3	63	7	10	5233	67	29	38	1	7	11	1	1	8	1	3	2	1	4
8	7	63	8	14	3342	68	26	42	-	-	-	-	-	-	-	-	-	-	-
9	4	63	9	11	3830	59	13	46	1	2	6	1	1	4	0	2	0	0	2

PLANKTON POPULATION

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION ANIMAS RIVER AT

CEDAR HILL, NEW MEXICO 056

DATE OF SAMPLE: MONTH	DAY	YEAR	DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes): 1ST SPECIES	1ST PERCENT	2ND SPECIES	2ND PERCENT	3RD SPECIES	3RD PERCENT	4TH SPECIES	4TH PERCENT	OTHER SPECIES PERCENT	FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES: PROTOZOA (Identifiable) (Number per ml.)	ROTIFERS: NUMBER PER LITER	ROTIFERS GENERA AND COUNT LEVEL (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	CRUSTACEA: NUMBER PER LITER	CRUSTACEA GENERA AND COUNT LEVEL (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	1	62	86	36	93	27	71	11	46	5	21	0		2											0							0	0
10	15	62	86	65	71	15	92	10	93	2	8	0		3											0							0	0
11	5	62	86	63	93	9	92	6	71	4	18	0		1											0							0	0
11	19	62	86	60	71	13	92	14	31	3	10	20		0											0							0	3
12	3	62	86	58	71	16	92	8	2	3	15	0		4											0							0	1
12	19	62										–	–	–											–							–	–
1	2	63	86	23	2	7	70	7	92	6	57	0		0											0							0	0
1	23	63	86	45	31	8	70	8	71	7	32	0		0											0							0	0
2	6	63										0	*	–											–							–	–
2	20	63	86	21	92	15	46	13	71	12	39	0		0											0							0	0
3	5	63	86	47	31	13	71	11	92	9	20	0		0											0							0	0
3	20	63										–	–	–											–							–	–
4	3	63	92	19	86	18	71	10	46	2	51	–	–	0											0							0	0
4	15	63	92	35	71	13	53	6	88	6	40	–	–	2											0							0	1
5	1	63	31	42	86	11	88	7	51	7	33	–	–	–											–							–	–
5	6	63	26	15	92	13	71	11	72	9	52	–	–	–											–							–	–
5	22	63	31	8	2	8	85	8	86	7	69	–	–	–											–							–	–
6	5	63	31	23	86	16	2	13	52	11	37	–	–	–											–							–	–
6	19	63	31	48	94	7	86	6	92	6	33	0	*	–											–							–	–
8	7	63										–	–	–											–							–	–
8	21	63										–	–	–											–							–	–
9	4	63										–	–	–											–							–	–
9	16	63										–	–	–											–							–	–

PLANKTON POPULATION

STATE NEW MEXICO
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION ANIMAS RIVER AT
CEDAR HILL, NEW MEXICO 56

DATE OF SAMPLE: MONTH	DAY	YEAR	ALGAE (Number per milliliter): TOTAL	BLUE-GREEN: COCCOID	BLUE-GREEN: FILA-MENT-OUS	GREEN: COCCOID	GREEN: FILA-MENT-OUS	FLAGELLATED (Pigmented): GREEN	FLAGELLATED (Pigmented): OTHER	DIATOMS: CENTRIC	DIATOMS: PENNATE	INERT DIATOM SHELLS: CENTRIC	INERT DIATOM SHELLS: PENNATE	MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	6TH GENUS	6TH COUNT LEVEL	7TH GENUS	7TH COUNT LEVEL	8TH GENUS	8TH COUNT LEVEL	9TH GENUS	9TH COUNT LEVEL	10TH GENUS	10TH COUNT LEVEL
10	1	62	400	0	0	70	0	0	0	20	320	70	1370																				
10	15	62	3200	0	20	20	0	0	0	20	3110	0	1550	91	4	88	2	92	2														
11	5	62	1500	0	0	0	0	0	0	20	1440	0	990	91	3	92	1																
11	19	62	5100	0	0	0	310	20	0	290	4470	40	370	91	5	92	2	88	2	48	2	77	1	81	1								
12	3	62	1900	0	0	0	0	0	0	160	1710	0	630	91	3	88	2	92	1														
12	19	62	10100	0	50	0	0	0	90	50	9880	0	18280																				
1	2	63	100	0	0	0	0	0	0	20	50	20	60																				
1	23	63	200	0	0	0	0	0	0	0	180	0	350																				
2	6	63	2500	0	0	20	0	40	0	710	1740	210	2120																				
2	20	63	900	0	0	0	0	20	90	20	770	70	840	91	1	92	1																
3	5	63	500	0	0	0	0	0	80	40	340	110	2460	91	1																		
3	20	63	200	0	0	0	0	0	0	20	180	0	90																				
4	3	63	600	0	20	20	0	20	0	0	480	0	730																				
4	15	63	4100	0	0	40	0	0	0	20	4050	40	5390	92	4	88	2	91	2	86	1	87	1	97	1								
5	1	63	1400	0	0	0	0	0	0	20	1410	0	1320	81	3	91	1																
5	6	63	700	0	0	0	0	20	0	0	660	0	1060	88	2																		
5	22	63	200	0	20	0	0	0	0	20	180	0	350																				
6	5	63	300	0	20	0	0	0	0	0	290	0	370																				
6	19	63	500	0	20	0	0	0	0	20	410	0	230	81	1	92	1																
8	7	63	2900	0	30	100	0	0	0	170	2580	170	2260																				
8	21	63	2600	0	0	0	0	0	0	40	2530	0	770																				
9	4	63	500	0	0	0	0	0	0	130	390	340	730																				
9	16	63	600	0	20	20	0	0	0	140	430	0	480																				

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION ANIMAS RIVER AT

CEDAR HILL, NEW MEXICO 56

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	12.0	9.6	8.2	1.9	-	-	-	.0	38	114	228	1	43	69	-	-	-
10	5	62	7.0	8.6	8.4	5.0	-	-	-	.0	58	234	242	2	8	72	-	510	-
10	8	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	840
10	9	62	12.0	10.2	8.4	2.3	-	-	-	.0	59	124	248	1	4	-	-	500	-
10	15	62	11.0	10.4	8.5	2.9	-	-	-	.0	48	120	254	-	-	180	-	450	300
10	22	62	10.0	9.8	8.2	2.0	-	-	-	.0	44	212	206	2	77	68	-	450	3000
10	29	62	9.0	11.0	8.5	.7	-	-	-	.0	27	174	244	-	20	-	-	460	470
11	5	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
11	13	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320
11	18	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1700
11	26	62	-	-	8.1	-	-	-	-	-	14	130	250	0	800	160	.0	390	760
12	3	62	-	-	7.7	-	-	-	-	-	40	120	260	0	*25	155	.0	440	130
12	10	62	-	-	8.1	-	-	-	-	-	14	124	270	0	*25	130	.0	372	80
12	19	62	-	-	7.8	-	-	-	-	-	17	140	290	-	*25	135	.0	380	-
12	26	62	-	-	7.6	-	-	-	-	-	24	136	300	-	*25	150	.0	450	-
1	7	63	-	-	8.0	-	-	-	-	-	26	116	500	-	*25	140	.0	440	-
1	23	63	.0	-	7.8	-	-	-	-	.1	-	144	-	-	-	-	-	-	210
1	30	63	.0	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	400
2	6	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6000
2	8	63	2.0	-	-	-	-	-	-	.1	-	-	-	-	-	-	-	-	-
2	13	63	1.0	-	8.1	-	-	-	-	.5	63	156	256	2	90	-	-	-	110
2	20	63	5.0	6.3	8.3	1.0	-	-	-	.1	56	132	252	1	65	186	-	-	200
2	27	63	6.0	5.7	8.0	1.5	-	2.7	5.2	.0	-	-	-	-	-	-	-	-	500
3	5	63	7.0	-	8.1	-	-	-	-	-	40	136	248	1	*25	160	.0	470	-
3	13	63	3.0	5.4	8.1	1.9	-	.9	3.9	.1	45	118	224	1	48	160	.0	460	170
3	20	63	5.0	5.5	8.1	2.6	-	1.8	5.6	.8	20	136	256	2	240	160	.0	425	-
3	27	63	-	-	7.2	-	-	-	-	-	7	104	200	0	320	76	.0	240	3600
4	3	63	5.0	6.5	8.0	1.7	-	1.8	4.6	.1	6	92	160	0	60	60	.0	220	640
4	10	63	-	-	8.2	-	-	-	-	-	7	92	170	5	*25	60	.0	197	-
4	15	63	-	-	7.4	-	-	-	-	-	10	88	140	0	145	50	.0	196	-
4	24	63	-	-	-	-	-	-	-	.0	10	108	190	0	*25	96	.0	270	50
5	1	63	-	-	-	-	-	-	-	-	11	96	200	5	*25	88	.0	250	-
5	8	63	-	-	-	-	-	-	-	-	7	64	100	5	170	24	.0	150	4800
5	15	63	-	-	7.4	-	77	2.4	4.8	.0	7	48	110	0	*25	46	.0	137	-
5	22	63	13.0	9.1	7.8	1.9	-	1.2	3.8	.0	4	60	90	5	*25	42	.0	139	4300
5	29	63	14.0	9.2	8.3	1.8	28	.2	3.8	.0	12	60	120	0	*25	46	.2	150	4000

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW MEXICO
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION ANIMAS RIVER AT
CEDAR HILL, NEW MEXICO 56

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
6	5	63	15.0	9.6	8.3	1.4	-	.2	1.7	.0	8	74	150	5	*25	56	.0	170	-
6	12	63	16.0	10.1	8.3	2.1	-	.1	.9	.0	14	84	150	0	*25	66	.0	200	200
6	19	63	18.0	9.8	8.3	3.9	-	.2	.5	.0	12	76	148	1	2	61	.4	270	150
6	26	63	18.0	8.9	8.0	1.6	14	.4	.5	.0	13	84	140	5	*25	73	.0	230	100
7	3	63	23.0	7.8	8.0	2.9	-	-	-	.1	20	104	188	10	*25	95	.2	300	-
7	10	63	22.0	5.6	7.7	3.5	-	-	-	-	14	110	192	5	1700	95	.0	280	-
7	17	63	22.0	9.1	8.1	7.9	-	1.3	1.3	.1	19	110	188	5	*25	115	.0	300	-
7	24	63	21.0	8.5	7.4	1.5	25	1.4	3.4	.2	23	118	200	0	*25	100	.0	330	7600
7	31	63	19.0	8.6	8.1	1.6	17	.7	1.6	.0	40	134	230	0	*25	125	.0	390	*200
8	7	63	22.0	7.6	8.0	2.0	19	.8	1.4	.0	20	130	220	0	150	110	.0	340	18000
8	14	63	23.0	7.3	8.0	1.3	-	-	-	.0	20	100	190	0	100	100	.0	280	5800
8	21	63	21.0	8.3	-	2.1	18	.8	1.8	.0	21	118	220	0	*25	122	.0	340	500
8	28	63	18.0	7.1	7.6	2.4	-	-	-	.1	10	80	140	0	400	58	.0	180	-
9	4	63	19.0	7.6	7.8	.8	-	-	-	.0	13	90	320	0	*25	80	.0	260	-
9	11	63	18.0	8.0	8.1	.7	-	-	-	.1	-	-	-	-	-	-	-	-	-
9	18	63	-	8.5	8.0	-	-	-	-	.0	17	108	190	0	*25	98	.0	280	-
9	25	63	18.0	8.9	8.1	1.2	-	-	-	.0	19	108	180	0	*25	98	.0	270	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Cedar Hill, New Mexico
Operated by U.S. Geological Survey

STATE New Mexico

MAJOR BASIN Colorado River

MINOR BASIN Middle Colorado-San Juan Rivers

STATION LOCATION Animas River at

Cedar Hill, New Mexico

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.409	.355	.340	.240	.300	.242	1.110	.598	1.800	.544	.238	.998
2	.379	.345	.310	.230	.320	.234	1.030	.631	1.700	.532	.253	.940
3	.361	.340	.290	.240	.350	.221	.836	.729	1.400	.484	.277	.778
4	.350	.361	.290	.250	.330	.242	.736	1.110	1.150	.484	.365	.666
5	.340	.355	.290	.240	.350	.230	.694	1.630	1.140	.526	.415	.659
6	.361	.350	.280	.220	.400	.221	.673	2.160	1.150	.478	.400	.750
7	.340	.340	.280	.210	.380	.226	.778	2.770	1.120	.442	.448	.924
8	.320	.320	.285	.210	.373	.234	.956	3.220	1.180	.520	.520	.820
9	.305	.315	.280	.220	.350	.247	.989	3.440	1.160	.598	.478	.680
10	.305	.320	.265	.220	.409	.247	.908	2.490	1.020	.799	.479	.624
11	.285	.315	.260	.200	.345	.251	.813	2.280	.884	.743	.580	.645
12	.270	.305	.251	.160	.310	.251	.860	2.230	.860	.729	.574	.574
13	.265	.295	.255	.130	.300	.238	1.020	2.270	1.080	.736	.550	.532
14	.260	.320	.260	.120	.265	.242	1.260	2.410	1.240	.708	.502	.550
15	.260	.361	.251	.130	.265	.255	1.520	1.860	1.430	.610	.448	.574
16	.285	.345	.247	.150	.275	.260	1.350	2.080	1.290	.550	.415	.520
17	.441	.345	.251	.170	.265	.242	1.140	2.700	1.070	.496	.415	.490
18	.543	.345	.260	.200	.251	.251	.940	2.960	.980	.442	.420	.460
19	.630	.330	.280	.230	.260	.242	.836	2.780	.972	.436	.425	.460
20	.508	.305	.265	.250	.265	.265	.729	2.740	.932	.405	.400	.454
21	.460	.320	.247	.230	.285	.330	.659	2.610	.956	.380	.425	.568
22	.434	.325	.230	.220	.280	.391	.598	2.230	.948	.410	.472	.592
23	.415	.320	.226	.220	.265	.460	.532	2.150	.908	.420	.520	.514
24	.403	.320	.226	.220	.270	.536	.580	1.960	.852	.390	.574	.478
25	.403	.315	.220	.220	.275	.598	.750	1.790	.778	.355	.550	.454
26	.397	.320	.200	.230	.265	.648	.836	1.650	.736	.308	.568	.436
27	.397	.310	.180	.220	.265	.819	.806	1.900	.708	.303	1.050	.415
28	.385	.300	.190	.210	.255	.950	.743	1.900	.659	.294	1.160	.400
29	.373	.295	.200	.220		.990	.652	2.050	.631	.261	.860	.365
30	.367	.300	.210	.220		1.020	.598	1.900	.586	.253	.799	.335
31	.367		.220	.230		1.030		2.000		.253	.884	

COLORADO RIVER AT YUMA, ARIZONA

The Yuma, Arizona station provides pollution surveillance on the Colorado River before the river enters Mexico. Samples are collected from the former intake of the Arizona Water Company.

The Colorado River is used as a source of irrigation water for the extensive developments above Yuma and for the disposal of irrigation drainage.

The Yuma station is directly influenced by the Wellton-Mohawk irrigation district drainage and the Gila River which enter the Colorado River immediately upstream. Resulting concentrations of major constituents during water year 1963 were:

	Concentration Range at Yuma mg/l	Recommended PHS Drinking Water Standard mg/l
Chloride	550 to 1,060	250
Sulfate	450 to 700	250
Total Dissolved Solids	1,950 to 3,040	500
Hardness	630 to 980	–

Yuma discharges its municipal waste into the Colorado River without treatment below the station.

Station Location:	Colorado River at Yuma, Arizona
Major Basin:	Colorado River
Minor Basin:	Lower Colorado River
Station at:	32°44' Latitude 114°42' Longitude
Miles above mouth:	91
Activation Date:	November 4, 1957
Sampled by:	Arizona Water Company
Field Analysis by:	Arizona Water Company U.S. Public Health Service
Other Cooperating Agencies:	Arizona State Department of Health
Hydrologic Data:	
Nearest pertinent gaging station:	At Yuma, Arizona
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	242,900 square miles
Period of record:	1902 to present
Average discharge in record period:	989 cfs. (WY 1962 only)
Maximum discharge in record period:	34,900 cfs. after 1934
Minimum discharge in record period:	41 cfs. after 1934

Remarks: Many diversions above gaging station affect flows after 1934. Irrigation water by-passes gaging station and returns to river. Flows regulated by operations of Hoover, Parker, and Davis dams since 1935, 1936, and 1950, respectively.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
3-4-63	0.10
3-11-63	0.07
3-18-63	0.08
3-25-63	0.08
4-1-63	0.08
4-8-63	0.08
4-15-63	0.07
4-22-63	0.07
5-20-63	0.07
5-27-63	0.10
6-3-63	0.09
6-10-63	0.08
6-17-63	0.07
6-24-63	0.08
7-1-63	0.07
7-8-63	0.07
7-15-63	0.07
7-22-63	0.08
7-29-63	0.08
8-5-63	0.08
8-12-63	0.08
8-20-63	0.10
8-26-63	0.06
9-2-63	0.07
9-9-63	0.07
9-23-63	0.13
9-30-63	0.15

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.61	.90
	Na	563	560
	K	9.4	9.5
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*50	*25
	Cd	*25	*25
	As	*50	*50
	B	688	575
	P	*63	*75
	Fe	*63	63
	Mo	*25	50
	Mn	*12	13
	Al	—	125
	Be	*.6	*.6
	Cu	*25	*13
	Ag	*5	*6
	Ni	*25	25
	Co	*50	*25
	Pb	*63	*63
	Cr	*13	63
	V	*50	*50
	Ba	94	38
	Sr	3500	2050

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.2	April to June	.9	.3
January to March	—	—	July to September	—	—

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT YUMA, ARIZONA 3

DATE SAMPLE TAKEN MO.	DAY	YR.	DATE OF DETERMINATION MO.	DAY	WATER ALPHA SUSPENDED pc/l	±	ALPHA DISSOLVED pc/l	±	ALPHA TOTAL pc/l	±	BETA SUSPENDED pc/l	±	BETA DISSOLVED pc/l	±	BETA TOTAL pc/l	±	PLANKTON DATE OF DETERMINATION MO.	DAY	GROSS ACTIVITY ALPHA pc/g	±	BETA pc/g	±
10	1	62	10	29	-	-	-	-	-	-	92	66	16	95	108	116						
10	8	62	12	19	-	-	-	-	-	-	1	56	23	79	24	97						
10	15	62	12	24	-	-	-	-	-	-	4	41	21	55	25	59						
10	22	62	12	3	0	0	0	3	0	3	3	3	53	43	56	43						
10	29	62	12	31	-	-	-	-	-	-	6	7	34	47	40	48						
11	26	62	12	12*	0	4	10	13	10	14	37	58	109	80	146	99						
12	24	62	2	5*	0	2	14	11	14	11	10	30	42	46	52	55						
1	28	63	2	18*	0	4	13	17	13	17	12	28	26	40	38	49						
2	25	63	3	22*	0	1	4	5	4	5	1	12	25	20	26	23						
3	25	63	4	15*	3	3	0	11	3	11	14	14	121	76	135	77						
4	29	63	5	17*	0	0	1	10	1	10	1	6	129	81	130	81						
5	27	63	6	17*	0	0	5	13	5	13	2	3	60	41	62	41						
6	24	63	7	10*	0	1	10	15	10	15	7	5	127	79	134	79						
7	29	63	8	16*	0	1	2	11	2	11	0	17	129	80	129	82						
8	26	63	9	23*	0	1	18	18	18	18	0	10	37	40	37	41						
9	30	63	10	17*	0	0	0	8	0	8	0	6	288	155	288	155						

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT

YUMA, ARIZONA 03

PLANKTON POPULATION

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)										MICROINVERTEBRATES																				
			1ST		2ND		3RD		4TH					ROTIFERS											CRUSTACEA								
															GENERA AND COUNT LEVEL (See text for Codes)											GENERA AND COUNT LEVEL (See text for Codes)							
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT	FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	8	62	46	9	92	9	6	8	75	7	67	–	–	0											0							2	0
10	15	62	46	17·	75	15	91	8	90	7	53	10	0	0											0							0	0
11	5	62	46	12	26	10	10	8	7	8	62	–	–	0											1							0	0
11	19	62										20	–	0											0							0	0
12	3	62	16	8	46	7	75	6	92	5	74	–	–	0											0							0	0
12	17	62	2	15	46	11	70	8	11	7	59	–	–	0											0							0	0
1	14	63										–	–	0											0							1	0
1	21	63	46	13	75	9	16	6	26	6	66	–	–	0											0							0	0
2	11	63	46	13	33	11	38	10	11	5	61	–	–	0											0							0	0
2	18	63	38	17	10	9	92	7	26	6	61	–	–	0											0							0	0
3	4	63	38	35	11	23	46	7	16	4	31	–	–	0											0							2	0
3	18	63	38	23	46	14	7	7	65	5	51	–	–	1											0							0	0
4	1	63	38	14	33	12	53	7	92	7	60	–	–	0											0							0	0
4	15	63	7	12	38	11	26	10	46	9	58	–	–	3											0							0	0
5	6	63	26	13	38	8	92	7	70	6	66	–	–	–											–							–	–
5	20	63	26	38	38	15	92	9	7	8	30	–	–	–											–							–	–
6	3	63	26	65	65	6	92	5	38	2	22	–	–	–											–							–	–
6	17	63	26	33	92	9	70	8	38	7	43	–	–	–											–							–	–
7	1	63										–	–	–											–							–	–
7	15	63	26	44	91	8	65	6	46	4	38	–	–	–											–							–	–
8	5	63	26	50	46	8	65	4	91	4	34	–	–	–											–							–	–
8	20	63	26	31	91	18	70	16	46	7	28	–	–	–											–							–	–
9	2	63	70	26	26	14	91	10	46	8	42	–	–	–											–							–	–
9	16	63										–	–	–											–							–	–
9	30	63	23	24	70	24	26	14	82	10	28	–	–	–											–							–	–

STATE	ARIZONA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	LOWER COLORADO RIVER
STATION LOCATION	COLORADO RIVER AT YUMA, ARIZONA

3

PLANKTON POPULATION

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	8	62	1700	170	20	0	0	40	0	370	1060	40	120	68	2	3	1																
10	15	62	700	20	10	80	0	10	0	100	480	0	100																				
11	5	62	200	0	0	0	0	0	0	30	150	0	270																				
11	19	62	100	0	0	0	0	0	0	20	120	0	150																				
12	3	62	600	0	0	0	0	0	0	40	540	0	40																				
12	17	62	400	0	0	0	0	40	0	20	310	20	90																				
1	14	63	200	0	0	0	0	0	0	50	170	0	110																				
1	21	63	400	0	0	0	0	0	0	0	420	0	80																				
2	11	63	400	0	0	0	0	20	0	110	310	40	810																				
2	18	63	200	0	0	0	0	0	70	0	90	0	290																				
3	4	63	300	0	0	0	0	0	0	40	290	20	400																				
3	18	63	100	0	0	0	0	0	0	0	110	0	310																				
4	1	63	500	0	0	70	0	20	0	150	260	20	660																				
4	15	63	600	0	0	20	0	40	0	110	440	70	240																				
5	6	63	400	0	0	0	0	20	0	70	350	20	310																				
5	20	63	900	0	0	90	0	0	0	400	370	20	400	68	2																		
6	3	63	1000	0	0	110	0	70	20	480	350	20	260	68	2																		
6	17	63	2100	0	0	130	0	130	0	700	1120	150	550	68	2	92	1	88	1														
7	1	63	700	0	0	170	0	20	0	0	560	60	60																				
7	15	63	2000	0	0	480	0	40	0	460	1010	90	200	38	2	68	2	87	1	92	1												
8	5	63	1800	0	0	220	30	0	0	100	1450	70	660	87	1	88	1	92	1														
8	20	63	1400	0	0	80	0	0	0	480	850	20	170	68	2	92	1	88	1														
9	2	63	1500	0	0	430	0	40	0	130	860	40	410	88	2	38	1	92	1														
9	16	63	1200	20	70	230	0	70	0	180	610	0	500																				
9	30	63	2100	0	0	160	0	110	0	570	1270	110	200	88	3	68	2																

ORGANIC CHEMICALS
RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE ARIZONA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER AT YUMA, ARIZONA 3

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	2	62	10	8	2988	269	28	241	0	7	11	1	1	9	0	3	2	1	4
11	5	62	11	13	3438	233	32	201	1	9	10	1	1	8	0	3	2	1	6
12	6	62	12	14	5820	193	13	180	0	3	6	1	0	5	0	2	1	0	1
1	10	63			*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	14	63	2	18	3392	232	42	189	3	12	11	1	2	8	0	4	3	2	7
3	13	63	3	16	1414#	468	62	406	-	-	-	-	-	-	-	-	-	-	-
4	10	63	4	16	3750	213	35	178	1	9	13	2	2	8	1	4	2	1	5
5	15	63	5	21	3537	319	44	275	-	-	-	-	-	-	-	-	-	-	-
6	17	63	6	25	1760	529	162	367	15	49	36	4	2	29	1	18	20	4	20
7	9	63	7	17	2120	571	95	476	4	24	23	2	3	17	1	11	9	2	22
8	6	63	8	14	4528	252	49	203	-	-	-	-	-	-	-	-	-	-	-
9	5	63	9	10	1875	420	91	329	4	27	23	1	2	18	2	11	10	1	15

* FLOW UNKNOWN
\# ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT YUMA, ARIZONA

3

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	23.0	9.0	8.2	–	–	–	–	–	950	200	880	–	30	–	–	–	2400
10	8	62	23.5	9.5	8.2	–	–	–	–	–	780	188	770	–	55	–	–	–	*330
10	15	62	21.0	9.7	8.2	–	–	–	–	–	975	216	870	–	44	–	–	–	1000
10	22	62	23.0	12.3	–	–	–	–	–	–	1040	212	980	–	22	–	–	–	*100
10	29	62	20.0	11.8	7.8	–	–	–	–	–	960	224	970	–	24	–	–	–	*100
11	5	62	20.0	9.5	8.2	–	–	–	–	–	670	180	730	–	26	–	–	–	900
11	13	62	18.0	12.5	8.2	–	–	–	–	–	980	212	900	5	*25	600	.0	2728	400
11	19	62	14.0	11.8	8.2	–	–	–	–	–	1030	148	830	0	*25	625	.0	2725	*100
11	26	62	17.0	11.1	8.2	–	–	–	–	–	720	126	720	0	*25	575	.0	2280	300
12	3	62	16.0	10.8	8.1	–	–	–	–	–	565	136	630	0	*25	500	.0	2215	–
12	10	62	15.0	10.0	8.1	–	–	–	–	–	550	174	700	0	*25	475	.0	1990	100
12	17	62	15.0	10.5	8.1	–	–	–	–	–	650	192	–	0	*25	500	.0	2000	*100
12	24	62	15.0	12.0	8.2	–	–	–	–	–	630	182	700	0	*25	500	.0	2000	–
1	14	63	12.0	14.0	8.2	–	–	–	–	–	1060	220	980	–	*25	675	.0	3040	100
1	21	63	11.0	17.4	8.2	–	–	–	–	–	970	208	910	–	*25	625	.0	2700	500
1	28	63	12.0	13.8	8.2	–	–	–	–	–	630	180	730	–	*25	500	.0	1950	500
2	11	63	16.0	13.0	8.2	–	–	–	–	–	610	180	730	–	*25	450	.0	2100	1500
2	18	63	15.0	12.5	8.2	–	–	–	–	–	610	180	670	0	*25	475	.0	2050	*100
2	25	63	16.5	10.5	8.2	–	–	–	–	–	860	208	890	0	*25	575	.0	2740	*100
3	4	63	15.5	12.7	8.0	–	–	–	–	–	1020	220	940	5	*25	600	.0	2800	*100
3	11	63	15.5	12.0	8.1	–	–	–	–	–	980	210	930	0	*25	580	.0	2900	100
3	18	63	15.0	12.5	8.1	–	–	–	–	–	840	184	840	0	*25	550	.0	2500	2000
3	25	63	18.0	12.0	8.1	–	–	–	–	–	880	184	880	5	*25	550	.0	2600	500
4	1	63	18.0	8.5	8.1	–	–	–	–	–	850	200	880	0	*25	580	.0	2600	1300
4	8	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100
4	15	63	18.0	8.6	8.0	–	–	–	–	–	900	200	840	0	*25	580	.0	2500	1400
4	22	63	17.0	8.6	7.4	–	–	–	–	–	900	200	880	5	*25	550	.0	2500	700
4	29	63	20.0	7.8	–	–	–	–	–	–	750	200	880	5	*25	580	.0	2600	–
5	6	63	24.0	7.6	8.0	–	–	–	–	–	900	200	960	0	*25	550	.0	2500	1800
5	13	63	21.0	8.0	8.1	–	–	–	–	–	850	200	840	0	*25	620	.0	2600	–
5	20	63	24.0	7.5	7.9	–	–	–	–	–	850	210	780	5	*25	625	.0	2700	–
5	27	63	23.0	7.5	8.0	–	–	–	–	–	830	210	880	0	*25	620	.0	2600	500
6	3	63	24.5	7.5	8.0	–	–	–	–	–	830	198	960	5	*25	570	.0	2500	1000
6	10	63	22.0	8.0	8.0	–	–	–	–	–	830	190	860	5	*25	570	.0	2300	1000
6	17	63	26.0	7.1	8.1	–	–	–	–	–	950	184	820	0	*25	550	.0	2400	*100
6	24	63	22.0	7.5	8.1	–	–	–	–	–	900	196	880	10	*25	580	.0	2500	1200
7	1	63	24.0	6.8	8.1	–	–	–	–	–	650	176	800	5	*25	510	.0	2200	50
7	8	63	25.5	7.2	8.0	–	–	–	–	–	800	182	740	0	*25	550	.0	2300	100

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE ARIZONA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER AT YUMA, ARIZONA

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
7	15	63	28.0	6.0	8.1	-	-	-	-	-	800	182	800	5	*25	570	.0	2300	300
7	22	63	27.5	6.9	8.1	-	-	-	-	-	1000	192	920	5	*25	580	.0	2700	50
7	29	63	27.0	7.2	8.1	-	-	-	-	-	850	186	800	5	*25	580	.0	2400	500
8	5	63	26.5	6.6	8.1	-	-	-	-	-	850	178	760	5	*25	550	.0	2300	200
8	12	63	28.0	6.0	7.9	-	-	-	-	-	810	180	780	0	*25	580	.0	2300	980
8	20	63	28.0	10.0	7.8	-	-	-	-	-	825	182	800	0	*25	580	.0	2220	580
8	26	63	27.5	7.0	8.0	-	-	-	-	-	825	174	780	0	*25	580	.0	2350	200
9	2	63	26.5	7.0	8.0	-	-	-	-	-	830	190	960	0	*25	620	.0	2600	1000
9	9	63	26.0	6.4	8.0	-	-	-	-	-	950	200	980	0	*25	630	.0	2600	-
9	16	63	25.0	6.8	7.9	-	-	-	-	-	1030	200	900	5	*25	700	.0	2900	-
9	23	63	28.0	7.6	7.8	-	-	-	-	1.4	750	176	680	5	*25	500	.0	1980	-
9	30	63	25.5	7.3	7.9	-	-	-	-	1.3	1030	208	920	5	*25	650	.0	2800	1800

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station below Yuma, Arizona
Operated by U.S. Geological Survey

STATE Arizona

MAJOR BASIN Colorado River

MINOR BASIN Lower Colorado River

STATION LOCATION Colorado River at Yuma, Arizona

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	1.080	.962	2.770	2.060	2.640	.989	1.110	1.920	1.130	1.720	1.080	1.040
2	.931	1.960	2.900	2.450	3.130	1.000	1.150	1.940	1.190	1.570	1.030	1.070
3	1.350	2.400	2.260	2.990	3.330	1.000	1.140	1.970	1.150	1.590	1.090	1.070
4	1.660	2.470	2.080	2.220	2.510	.993	1.150	1.800	1.030	1.330	1.250	1.100
5	1.150	2.360	2.060	1.960	2.100	1.030	1.100	2.000	.983	1.260	1.430	1.080
6	1.690	2.230	2.090	1.590	1.940	1.090	1.110	2.020	1.020	1.270	1.480	1.120
7	2.060	2.510	2.050	1.440	1.790	.956	1.090	1.960	1.050	1.420	1.450	1.090
8	2.390	2.550	2.140	1.280	1.900	.910	1.240	2.000	1.070	1.460	1.410	1.020
9	3.020	2.240	2.180	1.220	2.020	.967	1.240	1.620	1.110	1.420	1.420	.991
10	2.790	1.700	2.090	.968	2.030	.960	1.110	1.280	1.280	1.390	1.380	.980
11	2.730	1.190	2.080	.914	1.930	.991	1.080	1.180	1.330	1.440	1.430	1.780
12	1.950	1.110	2.120	.907	1.720	1.060	1.140	1.290	1.310	1.480	1.430	1.960
13	1.190	1.040	2.120	.856	1.960	1.070	1.140	1.240	1.340	1.430	1.390	2.010
14	1.220	1.080	2.010	.855	2.020	1.080	1.070	1.190	1.310	1.410	1.320	2.040
15	1.160	1.150	1.960	1.020	2.410	1.080	1.140	1.320	1.340	1.400	1.350	2.030
16	.963	1.630	1.950	1.300	2.800	1.050	1.100	1.470	1.380	1.380	1.410	2.030
17	1.020	1.520	1.960	.976	2.800	1.170	1.430	1.770	1.320	1.390	1.440	2.280
18	1.000	1.120	2.140	.948	2.140	1.160	1.230	1.580	1.130	1.330	1.430	4.190
19	1.000	1.040	2.560	.965	1.940	1.120	1.130	1.220	1.060	1.040	1.410	3.370
20	.930	1.140	2.340	.947	2.030	1.120	1.110	1.190	1.120	1.040	1.350	4.080
21	.937	1.180	2.150	.978	2.060	1.120	1.120	1.130	1.380	1.070	1.370	3.460
22	.945	1.080	2.010	1.730	1.860	1.060	1.180	1.160	1.170	1.060	1.430	2.840
23	.963	1.360	2.200	2.160	1.820	1.060	1.390	1.250	1.130	1.040	1.420	2.790
24	.920	1.720	2.360	2.100	2.180	1.120	1.570	1.120	1.110	1.010	1.460	2.940
25	1.000	1.370	2.180	2.090	2.070	1.070	1.980	1.240	1.070	1.160	1.470	1.940
26	1.080	2.210	2.020	2.120	2.120	1.070	1.870	1.850	1.210	1.160	1.460	1.370
27	.952	3.210	2.080	2.370	2.120	1.210	2.040	1.940	1.410	1.150	1.310	1.210
28	1.060	2.770	2.030	2.320	1.760	1.170	2.000	2.020	1.720	1.060	1.410	1.210
29	.868	2.320	2.090	2.320		1.090	2.090	1.950	1.830	1.240	1.280	1.210
30	.864	2.550	2.120	2.540		1.050	1.960	1.950	1.860	1.180	1.150	1.170
31	.908		2.130	2.360		1.050		1.140		1.040	1.130	

COLORADO RIVER ABOVE PARKER DAM, ARIZONA-CALIFORNIA

This Public Health Service Water Pollution Surveillance System station is located in Whitset Pumping Plant which diverts Colorado River water from Lake Havasu to the Metropolitan Water District of Southern California. The Los Angeles and San Diego metropolitan areas use this water as a major portion of their municipal supplies. A portion of this water is used for industrial purposes and to recharge ground water aquifers.

There are no other municipal, industrial or agricultural uses made of this water in the Parker Dam-Boulder City reach. Needles, California, about 70 miles upstream, draws its supply from wells and discharges its wastes through lagoons to the main stem.

The August 7 sample had an unusually high count of nuisance organisms which are often responsible for taste problems. Over 2,000 per milliliter of the flagellate Peridinium and over 7,000 per milliliter of the diatom Synedra were present.

Station Location:	Colorado River above Parker Dam, Arizona-California
Major Basin:	Colorado River
Minor Basin:	Lower Colorado River
Station at:	34°18' Latitude 114°11' Longitude
Miles above mouth:	258
Activation Date:	January 1, 1958
Sampled by:	Metropolitan Water District of Southern California
Field Analysis by:	Metropolitan Water District of South California U.S. Public Health Service
Other Cooperating Agencies:	California State Department of Health California State Water Quality Control Board
Hydrologic Data:	
Nearest pertinent gaging station:	Below Parker Dam, Arizona
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	178,800 square miles
Period of record:	1934 to present
Average discharge in record period:	13,430 cfs.
Maximum discharge in record period:	42,400 cfs.
Minimum discharge in record period:	1,350 cfs.

Remarks: Flows regulated by operations of Hoover, Parker, and Davis dams since 1935, 1936, and 1950, respectively.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
7-1-63	0.03
7-17-63	0.03
8-12-63	0.04
8-19-63	0.05
9-9-63	0.02

ELEMENTAL ANALYSES

		Composite Interval	
		10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.45	.50
	Na	105	120
	K	6.8	6.3
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	*8	21
	Cd	*8	*7
	As	*75	*70
	B	105	95
	P	*38	*35
	Fe	15	*14
	Mo	41	63
	Mn	*2	*4
	Al	—	*35
	Be	*.2	*.2
	Cu	6	*4
	Ag	*2	*2
	Ni	*4	7
	Co	*15	*7
	Pb	38	*18
	Cr	*4	*18
	V	*8	*35
	Ba	143	63
	Sr	865	655

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.3	.2	April to June	—	—
January to March	—	—	July to September	1.0	.2

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE CALIFORNIA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER ABOVE PARKER DAM, ARIZONA-CALIFORNIA 4

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	2	62	12	13	0	1	4	4	4	4	0	23	11	34	11	41						
10	17	62	11	15	0	1	5	4	5	4	1	10	22	27	23	29						
10	22	62	11	16	0	1	3	3	3	3	11	11	47	29	58	31						
11	20	62	12	14*	12	3	10	5	22	6	3	23	14	28	17	36						
12	17	62	2	5*	1	2	6	4	7	4	53	30	4	24	57	26						
1	28	63	2	18*	0	1	13	6	13	6	82	12	186	18	268	22						
2	18	63	3	27*	0	2	6	5	6	5	0	52	29	29	29	60						
3	18	63	4	25*	0	0	9	4	9	4	1	6	20	29	21	30						
4	15	63	6	5*	1	1	9	5	10	5	1	11	41	18	42	21						
5	21	63	6	21*	1	2	7	5	8	5	0	22	15	19	15	29						
6	25	63	7	15*	0	0	6	4	6	4	2	2	23	14	25	14						
7	17	63	9	6*	0	0	9	5	9	5	0	26	19	18	19	32						
8	19	63	10	8*	0	0	7	5	7	5	0	5	31	18	31	19						
9	18	63	11	6*	0	0	6	5	6	5	4	5	13	17	17	18						

PLANKTON POPULATION

STATE CALIFORNIA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER ABOVE PARKER DAM, ARIZONA-CALIFORNIA 004

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES																			
			1ST		2ND		3RD		4TH					ROTIFERS											CRUSTACEA							NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	2	62	8	50	23	12	91	12	92	3	23	-	-	127	18	4	17	3	9	3					3	50	1					-	-
10	17	62	25	59	8	15	91	8	82	3	15	-	-	5											0							0	0
11	6	62	91	27	8	19	25	14	92	7	33	-	-	2											0							0	0
11	21	62	8	27	25	10	82	7	92	6	50	-	-	0											0							0	0
12	3	62										-	-	48	17	3	11	2							3	51	1					1	0
12	17	62	56	56	28	4	86	3	92	3	34	-	-	2											0							0	0
1	7	63										-	-	3											0							0	1
1	21	63										10	-	0											0							0	0
2	4	63	82	26	9	20	80	6	27	5	43	40	-	0											0							0	0
2	18	63										-	-	0											0							0	0
3	4	63										-	-	107	11	4	17	3							11	76	2					0	0
3	18	63	9	22	61	13	92	9	47	9	47	-	-	2											0							0	0
4	1	63	91	33	89	11	2	6	92	6	44	-	-	159	11	5	17	3							9	50	1	51	1	76	1	0	0
4	15	63										-	-	282	11	6	17	5	15	1					3							0	0
5	7	63										-	-	-											-							-	-
5	20	63	71	31	52	27	2	9	65	4	29	-	-	-											-							-	-
6	3	63										-	-	-											-							-	-
6	17	63	91	88	25	2	92	2	26	1	7	-	-	-											-							-	-
7	1	63	91	83	8	5	26	3	82	3	6	-	-	-											-							-	-
7	17	63	91	85	25	2	2	2	26	1	10	-	-	-											-							-	-
8	7	63	91	84	92	3	8	3	70	1	9	-	-	-											-							-	-
8	19	63	91	81	8	4	18	4	27	2	9	-	-	-											-							-	-
9	4	63	91	60	8	17	30	12	92	2	9	-	-	-											-							-	-
9	16	63	91	72	8	18	2	2	70	2	6	-	-	-											-							-	-

PLANKTON POPULATION

STATE CALIFORNIA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER ABOVE PARKER DAM, ARIZONA—CALIFORNIA 4

DATE OF SAMPLE: MONTH	DAY	YEAR	TOTAL	ALGAE (Number per milliliter): BLUE-GREEN: COCCOID	BLUE-GREEN: FILA-MENT-OUS	GREEN: COCCOID	GREEN: FILA-MENT-OUS	FLAGELLATED (Pigmented): GREEN	FLAGELLATED (Pigmented): OTHER	DIATOMS: CENTRIC	DIATOMS: PENNATE	INERT DIATOM SHELLS: CENTRIC	INERT DIATOM SHELLS: PENNATE
10	2	62	200	0	10	40	0	10	80	0	100	0	20
10	17	62	300	0	0	90	0	50	50	0	70	70	0
11	6	62	00	0	0	0	0	20	0	30	0	50	30
11	21	62	500	0	0	210	0	0	0	40	250	40	80
12	3	62	100	0	0	30	0	0	0	0	50	0	50
12	17	62	100	0	0	30	0	0	0	50	50	50	150
1	7	63	00	0	0	20	0	20	20	0	0	0	20
1	21	63	200	0	30	110	0	0	40	0	40	10	60
2	4	63	200	0	0	60	0	0	0	150	20	150	110
2	18	63	100	0	0	20	0	0	20	50	20	20	50
3	4	63	100	0	0	30	0	0	30	20	0	20	50
3	18	63	1100	0	170	20	0	0	20	400	440	190	320
4	1	63	200	0	0	20	0	20	0	0	150	20	180
4	15	63	200	0	0	20	0	120	0	20	50	0	50
5	7	63	00	0	0	0	0	0	0	0	0	0	0
5	20	63	200	0	20	20	0	0	0	40	110	0	240
6	3	63	300	20	0	70	0	180	0	70	0	0	0
6	17	63	1100	70	20	110	0	40	290	110	440	0	20
7	1	63	1500	20	0	400	0	90	220	70	660	0	20
7	17	63	1200	0	0	460	0	40	20	40	640	0	20
8	7	63	11700	0	40	1100	0	180	2110	110	8140	40	530
8	19	63	800	0	0	60	0	20	40	20	620	0	40
9	4	63	1300	20	0	350	0	20	0	130	790	70	370
9	16	63	2400	70	0	500	0	70	0	110	1530	20	1060

MOST ABUNDANT ALGAE - *Genera and Count Level per ml. (See text for Codes)*

MONTH	DAY	YEAR	1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	6TH GENUS	6TH COUNT LEVEL	7TH GENUS	7TH COUNT LEVEL	8TH GENUS	8TH COUNT LEVEL	9TH GENUS	9TH COUNT LEVEL	10TH GENUS	10TH COUNT LEVEL
10	2	62																				
10	17	62																				
11	6	62																				
11	21	62	38	1																		
12	3	62																				
12	17	62																				
1	7	63																				
1	21	63																				
2	4	63																				
2	18	63																				
3	4	63																				
3	18	63	71	1	77	1	17	1														
4	1	63																				
4	15	63																				
5	7	63																				
5	20	63																				
6	3	63	92	2	63	1																
6	17	63	92	3	35	1																
7	1	63	92	2	38	1																
7	17	63	92	6	63	4	38	2	88	2	44	1	76	1	87	1	35	1				
8	7	63	92	2																		
8	19	63	92	2	87	1																
9	4	63	92	3	39	1	76	1														
9	16	63																				

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER

(Parts per billion)

STATE CALIFORNIA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER ABOVE PARKER DAM, ARIZONA-CALIFORNIA 4

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
1	18	63	1	30	4629	178	52	126	4	11	20	1	2	17	0	5	3	1	8
2	2	63	2	13	4365	156	33	123	1	10	12	1	1	9	1	3	1	1	5
2	26	63	3	11	4730	196	50	146	-	-	-	-	-	-	-	-	-	-	-
4	1	63	4	14	5110	158	60	98	2	14	26	7	3	15	1	5	3	1	9
5	1	63	5	13	5990	130	39	91	-	-	-	-	-	-	-	-	-	-	-
6	3	63	6	14	5460	163	64	99	2	13	20	4	1	15	0	16	5	2	6
7	1	63	7	12	5210	162	80	82	-	-	-	-	-	-	-	-	-	-	-
8	1	63	8	12	4680	195	82	113	7	24	20	4	2	14	0	10	9	2	10
9	1	63	9	12	4650	219	89	130	-	-	-	-	-	-	-	-	-	-	-

STATE CALIFORNIA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER ABOVE PARKER DAM, ARIZONA-CALIFORNIA 4

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	2	62	27.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	17	62	22.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	22	62	-	-	8.1	-	-	-	-	-	94	120	356	0	*25	290	.0	735	-
11	6	62	-	-	8.1	-	-	-	-	-	88	126	320	0	*25	270	.0	703	-
11	12	62	-	-	8.1	-	-	-	-	-	82	118	312	0	*25	270	.0	752	-
12	3	62	15.5	-	8.1	-	-	-	-	-	80	120	300	0	*25	305	.0	750	-
12	17	62	15.0	-	8.1	-	-	-	-	-	-	124	332	0	*25	290	.0	725	-
1	7	63	12.0	-	8.1	-	-	-	-	-	90	124	336	-	*25	300	.0	730	-
1	14	63	9.5	-	8.0	-	-	-	-	-	88	122	336	-	*25	280	.0	740	-
1	21	63	8.9	-	8.1	-	-	-	-	-	100	120	340	-	*25	290	.0	720	-
1	28	63	8.9	12.9	8.2	1.1	-	-	-	-	90	132	326	-	*25	290	.0	710	-
2	4	63	10.0	12.9	8.2	1.4	-	-	-	-	92	128	350	0	*25	320	.0	720	-
2	11	63	11.4	12.6	8.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	18	63	13.0	12.2	8.2	.9	-	-	-	-	88	128	336	0	*25	295	.0	760	-
2	25	63	13.5	11.7	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	4	63	14.0	12.6	8.2	.5	-	-	-	-	-	-	-	-	-	-	-	-	-
3	11	63	14.5	12.7	8.2	.7	-	-	-	-	84	130	340	0	*25	290	.0	750	-
3	18	63	14.0	12.5	8.2	.4	-	-	-	-	-	128	330	0	*25	300	.0	725	-
3	25	63	15.0	12.6	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	1	63	16.0	12.7	8.2	-	-	-	-	-	88	128	410	0	*25	310	.0	740	-
4	15	63	17.5	12.6	7.4	-	-	-	-	-	86	128	340	0	*25	310	.0	740	-
5	7	63	19.0	-	8.3	-	-	-	-	-	98	136	350	5	*25	310	.0	740	-
5	21	63	-	-	-	-	-	-	-	-	82	128	330	5	*25	300	.0	700	-
5	27	63	22.0	11.8	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	3	63	23.0	-	8.5	-	-	-	-	-	82	128	340	5	*25	280	.0	690	-
6	10	63	22.0	9.8	8.1	-	-	-	-	-	78	128	330	5	*25	300	.0	690	-
6	17	63	24.2	11.4	8.5	-	-	-	-	-	90	122	340	5	*25	290	.0	700	-
6	23	63	-	-	-	-	-	-	-	-	88	120	320	5	*25	300	.0	700	-
7	1	63	24.9	-	8.4	-	-	-	-	-	82	118	340	0	*25	290	.0	710	-
7	17	63	23.0	-	8.0	-	-	-	-	-	80	126	340	0	*25	320	.0	690	-
8	12	63	-	-	-	-	-	-	-	-	80	120	340	0	*25	290	-	680	-
8	19	63	25.0	9.2	8.0	.4	-	-	-	-	80	120	330	0	*25	280	.0	670	-
9	9	63	26.0	11.0	8.2	-	-	-	-	-	100	116	330	0	*25	270	.0	700	-
9	16	63	25.0	9.3	8.1	-	-	-	-	-	86	116	310	5	*25	290	.0	680	-

STREAM FLOW DATA - 1962-1963	STATE: California
Thousand Cubic Feet per Second	MAJOR BASIN: Colorado River
PROVISIONAL--SUBJECT TO REVISION	MINOR BASIN: Lower Colorado River
Gaging Station below Parker Dam Operated by U.S. Geological Survey	STATION LOCATION: Colorado River above Parker Dam, Arizona-California

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	8.890	13.900	5.460	4.780	6.220	10.600	14.400	11.300	13.000	13.600	15.100	12.100
2	9.400	16.100	5.750	3.240	6.220	11.500	14.100	10.800	13.000	13.400	15.300	12.600
3	9.660	17.200	5.950	2.350	6.340	11.100	13.900	11.500	12.800	14.000	15.600	11.700
4	10.700	16.000	5.740	2.560	6.860	11.800	12.800	11.400	13.200	14.000	15.300	12.500
5	10.900	9.810	5.240	2.640	7.830	12.100	13.200	12.000	13.700	14.800	16.200	10.500
6	10.600	6.600	4.780	2.900	7.990	11.600	13.500	11.300	12.700	15.000	15.000	12.000
7	10.400	6.680	5.550	2.880	8.370	10.600	13.600	11.400	13.200	15.400	14.200	11.900
8	10.400	5.720	5.780	3.210	8.880	11.000	13.900	11.600	13.400	15.400	12.700	11.600
9	9.010	6.380	5.660	4.020	7.820	11.300	13.500	11.100	13.600	15.400	13.600	12.300
10	7.590	6.460	5.300	5.140	7.520	11.400	12.700	11.200	14.300	15.100	15.300	12.700
11	6.590	6.440	5.040	6.480	7.460	11.000	11.400	11.200	13.400	14.500	14.800	12.700
12	7.350	5.980	4.700	7.270	8.010	10.900	12.200	11.700	13.000	15.400	14.800	12.500
13	7.160	5.600	4.190	6.900	8.200	11.100	11.000	11.800	11.400	15.100	14.400	13.200
14	6.840	5.110	5.440	5.870	7.520	11.900	11.000	12.000	12.600	14.900	14.000	12.900
15	7.490	4.700	5.670	5.140	7.820	12.900	10.400	11.000	12.900	15.400	12.700	13.000
16	7.140	5.640	5.630	4.840	7.880	12.600	10.500	10.100	12.600	15.400	11.600	13.000
17	7.210	5.210	4.340	5.180	8.450	11.400	9.730	10.100	13.200	15.600	10.900	11.400
18	4.410	5.480	3.560	7.430	8.740	11.400	9.560	10.700	14.000	14.100	10.900	6.190
19	5.040	5.270	3.150	9.050	8.730	11.800	10.500	10.900	14.400	15.700	12.500	8.040
20	5.170	5.380	3.150	9.240	8.360	11.400	10.600	12.000	14.600	15.900	12.700	8.580
21	4.920	5.010	2.900	7.120	8.160	11.400	10.700	11.300	17.200	15.600	12.700	8.460
22	5.470	4.960	2.640	7.210	9.730	12.700	9.840	11.200	16.700	15.400	12.300	8.170
23	5.220	7.140	3.800	7.670	9.710	12.400	10.400	11.100	16.800	15.700	13.200	6.480
24	5.040	6.710	4.630	6.220	11.000	12.300	10.500	12.000	17.000	15.500	13.300	6.440
25	4.630	6.290	4.120	6.220	10.500	12.400	10.700	11.900	16.800	15.000	13.000	8.180
26	4.630	6.370	3.720	6.670	10.400	13.200	11.600	12.400	15.700	15.500	12.800	8.920
27	6.360	6.300	3.640	6.920	10.200	13.200	10.100	12.200	14.600	15.700	12.300	10.300
28	7.330	6.150	4.700	6.540	10.700	12.600	10.000	13.000	15.000	15.600	12.300	10.500
29	8.710	5.390	4.340	6.670		13.500	10.400	12.200	14.500	16.000	11.400	10.500
30	10.800	5.000	5.040	6.600		13.700	11.300	11.500	14.300	16.500	11.500	10.900
31	12.400		4.850	5.700		13.600		12.900		16.000	11.800	

COLORADO RIVER NEAR BOULDER CITY, NEVADA

Water samples are taken from the booster pump station on Boulder City intake which taps Hoover Dam Penstocks. The intake elevation is variable.

Hoover Dam created Lake Mead which has a detention time of about two years for the average Colorado River flow. The evaporation rate is about seven feet per year. Lake Mead is a recreational water and receives some pollution from this source. Above Lake Mead the river flows through the Grand Canyon of the Colorado.

Station Location: Colorado River near Boulder City, Nevada

Major Basin: Colorado River

Minor Basin: Lower Colorado River

Station at: 36°01' Latitude 114°44' Longitude

Miles above mouth: 415

Activation Date: July 18, 1958

Sampled by: Boulder City Water Department

Field Analysis by: Boulder City Water Department
U.S. Public Health Service

Other Cooperating Agencies: Nevada State Department of Public Health
U.S. Bureau of Reclamation

Hydrologic Data:

Nearest pertinent gaging station: Below Hoover Dam, Nevada

Gaging station operated by: U.S. Bureau of Reclamation
Discharges published by U.S. Geological Survey

Drainage area at gaging station: 167,800 square miles

Period of record: 1933 to present

Average discharge in record period: 14,370 cfs.

Maximum discharge in record period: 36,000 cfs.

Minimum discharge in record period: 152 cfs.

Remarks: Flows regulated since February 1935 by operations of Hoover Dam. Upstream irrigation, municipal and industrial diversions.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
7-9-63	0.02
7-16-63	0.03
7-23-63	0.03
8-6-63	0.03
8-13-63	0.03
8-20-63	0.03
8-28-63	0.02
9-3-63	0.02
9-24-63	0.05

ELEMENTAL ANALYSES

		Composite Interval	
		10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.36	.45
	Na	95	95
	K	5.7	6.2
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	259	24
	Cd	*7	*7
	As	*74	*68
	B	118	95
	P	*19	*34
	Fe	33	17
	Mo	*75	*75
	Mn	*4	*3
	Al	–	*34
	Be	*.2	*.2
	Cu	*7	*4
	Ag	*2	*2
	Ni	*7	*7
	Co	*15	*7
	Pb	*19	*17
	Cr	*4	*17
	V	*7	*34
	Ba	81	61
	Sr	115	646

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.5	.2	April to June	1.8	.3
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEVADA

MAJOR BASIN COLORADO RIVER

MINOR BASIN LOWER COLORADO RIVER

STATION LOCATION COLORADO RIVER NEAR BOULDER CITY, NEVADA 5

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER																RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA								DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL						ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±			MO.	DAY	pc/g	±	pc/g	±
10	2	62	12	17	-	-	-	-	-	-	3	8	16	10	19	13								
10	9	62	12	22	-	-	-	-	-	-	6	19	26	25	32	31								
10	16	62	11	6	0	1	11	6	11	6	5	26	34	34	39	43								
10	23	62	12	5	1	2	6	4	7	4	11	23	27	29	38	37								
10	30	62	12	17	1	2	8	5	9	5	15	16	26	22	41	27								
11	27	62	12	18*	0	1	9	5	9	5	0	50	15	18	15	53								
12	24	62	2	8*	0	2	7	4	7	4	3	22	21	27	24	35								
1	29	63	2	18*	0	1	8	5	8	5	12	11	33	15	45	19								
2	26	63	3	22*	0	1	6	3	6	3	1	6	13	9	14	8								
3	26	63	4	15*	0	1	6	6	6	6	3	3	24	15	27	15								
4	30	63	5	17*	0	0	3	4	3	4	2	5	20	26	22	26								
5	28	63	6	13*	0	0	9	6	9	6	5	6	61	30	66	31								
6	25	63	7	15*	0	1	2	5	2	5	2	3	23	15	25	15								
7	30	63	8	16*	0	0	12	5	12	5	0	23	35	18	35	29								
8	27	63	9	23*	0	1	11	6	11	6	2	3	20	8	22	9								
9	24	63	10	17*	0	1	8	5	8	5	0	12	13	28	13	30								

PLANKTON POPULATION

STATE NEVADA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER NEAR
BOULDER CITY, NEVADA 005

Date of Sample: Month	Day	Year	Dominant Species of Diatoms and Percent of Total Diatoms (See text for Codes): 1st Species	1st Percent	2nd Species	2nd Percent	3rd Species	3rd Percent	4th Species	4th Percent	Other Species Percent	Fungi and Sheathed Bacteria Number per ml.	Protozoa (Identifiable) Number per ml.	Microinvertebrates: Rotifers: Number per Liter	Rotifers Genera and Count Level (See text for Codes): 1st Genus	1st Count Level	2nd Genus	2nd Count Level	3rd Genus	3rd Count Level	4th Genus	4th Count Level	5th Genus	5th Count Level	Crustacea: Number per Liter	Crustacea Genera and Count Level (See text for Codes): 1st Genus	1st Count Level	2nd Genus	2nd Count Level	3rd Genus	3rd Count Level	Nematodes (Identifiable) Number per liter	Other Animal Forms (Number per liter)
10	2	62	8	44	91	26	47	8	55	7	15	-	-	0											0							0	0
10	15	62										80	-	0											0							0	0
11	5	62										-	-	0											0							0	0
11	19	62										-	-	0											0							0	0
12	3	62										20	-	0											0							0	0
12	17	62										-	-	0											0							0	0
1	7	63										-	-	0											0							1	0
1	21	63										40	-	0											0							0	0
2	4	63										-	-	0											0							0	0
2	18	63										220	-	0											0							0	0
3	4	63										-	-	0											1							0	0
3	18	63										-	-	0											0							0	0
4	2	63										-	-	0											1							0	0
4	15	63										-	-	0											0							0	0
5	6	63										-	-	-											-							-	-
5	20	63										-	-	-											-							-	-
6	3	63										-	-	-											-							-	-
6	17	63										-	-	-											-							-	-
7	1	63										-	-	-											-							-	-
8	5	63										-	-	-											-							-	-
8	19	63										-	-	-											-							-	-
9	2	63										-	-	-											-							-	-
9	16	63										-	-	-											-							-	-

STATE	NEVADA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	LOWER COLORADO RIVER
STATION LOCATION	COLORADO RIVER NEAR
	BOULDER CITY, NEVADA 5

PLANKTON POPULATION

DATE OF SAMPLE			ALGAE *(Number per milliliter)*									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - *Genera and Count Level per ml. (See text for Codes)*																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED *(Pigmented)*		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	2	62	100	0	0	0	0	0	0	40	80	0	0																				
10	15	62	100	0	0	10	0	0	0	0	40	0	0																				
11	5	62	00	0	0	0	0	0	0	0	0	0	30																				
11	19	62	500	0	0	130	0	40	0	0	290	0	40																				
12	3	62	00	0	0	0	0	0	0	0	0	0	20																				
12	17	62	00	0	0	0	0	0	0	50	0	0	20																				
1	7	63	00	0	0	0	0	0	0	0	10	0	0																				
1	21	63	100	0	30	0	0	0	0	40	70	40	0																				
2	4	63	00	0	0	0	0	0	0	0	0	0	0																				
2	18	63	00	0	0	0	0	0	10	0	0	0	30																				
3	4	63	00	0	0	0	0	0	0	0	0	0	30																				
3	18	63	00	0	0	0	0	0	0	0	0	20	0																				
4	2	63	00	0	0	0	0	0	0	20	0	0	0																				
4	15	63	100	0	0	0	0	0	10	10	30	10	30																				
5	6	63	00	0	0	0	0	0	0	0	0	0	20																				
5	20	63	00	0	0	0	0	0	0	0	0	0	40																				
6	3	63	00	0	0	0	0	0	0	30	10	30	0																				
6	17	63	00	0	0	0	0	0	0	0	20	0	0																				
7	1	63	00	0	0	20	0	0	0	0	20	0	20																				
8	5	63	200	100	0	30	0	0	0	50	30	100	0																				
8	19	63	00	0	0	0	0	0	0	20	0	0	0																				
9	2	63	100	0	20	0	0	0	20	0	20	0	0																				
9	16	63	00	0	0	0	0	0	0	0	0	20	0																				

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE	NEVADA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	LOWER COLORADO RIVER
STATION LOCATION	COLORADO RIVER NEAR BOULDER CITY, NEVADA

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	14	62	11	23	1811	323	66	257	-	-	-	-	-	-	-	-	-	-	-
12	7	62	1	3	4910	216	49	167	-	-	-	-	-	-	-	-	-	-	-
12	7	62		*	6721	244	53	191	1	13	18	4	2	12	0	5	3	1	12
1	23	63	2	18	5260	155	42	113	-	-	-	-	-	-	-	-	-	-	-
3	11	63	4	2	5040	169	57	112	2	17	13	1	1	10	1	6	6	1	12
4	19	63	4	27	4870	134	44	90	-	-	-	-	-	-	-	-	-	-	-
5	13	63	5	21	4920	156	52	104	4	14	12	1	1	10	0	4	5	1	12
6	10	63	6	18	4970	169	51	118	-	-	-	-	-	-	-	-	-	-	-
7	8	63	7	16	4970	142	57	85	1	20	11	0	0	10	1	5	7	2	11
7	29	63	8	7	4990	163	53	110	-	-	-	-	-	-	-	-	-	-	-
8	26	63	9	3	5110	139	48	91	2	19	8	0	0	8	0	4	5	1	9
9	20	63	9	30	5140	140	45	95	-	-	-	-	-	-	-	-	-	-	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEVADA
MAJOR BASIN COLORADO RIVER
MINOR BASIN LOWER COLORADO RIVER
STATION LOCATION COLORADO RIVER NEAR
BOULDER CITY, NEVADA 5

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	2	62	15.0	9.8	8.1	-	-	10.8	12.8	-	82	132	338	-	-	211	-	-	33
10	9	62	15.0	10.6	7.8	-	-	10.4	14.8	-	82	132	340	-	-	224	-	-	14000
10	16	62	15.0	11.8	8.1	-	-	10.9	14.8	-	82	126	340	5	*25	170	.0	731	10
10	23	62	15.0	10.0	8.0	-	-	10.7	12.7	-	86	128	340	-	-	200	-	-	20
10	30	62	15.0	10.7	8.1	-	-	10.7	15.0	-	84	130	348	-	-	182	-	-	70
11	6	62	14.0	6.6	8.1	-	-	10.9	14.9	-	80	130	340	-	-	182	-	740	20
11	13	62	13.5	7.0	7.8	-	-	12.9	16.9	-	88	124	340	-	-	182	-	-	5
11	20	62	13.5	7.0	7.8	-	-	10.8	12.8	-	86	130	340	-	-	203	-	-	20
11	27	62	13.0	6.8	7.9	-	-	12.6	14.4	-	86	130	344	-	-	226	-	790	5
12	4	62	13.0	7.0	7.9	-	-	-	-	-	79	126	344	0	*25	280	.0	714	*3
12	11	62	13.0	6.8	7.9	-	-	-	-	-	76	126	328	0	*25	300	.0	720	*3
12	17	62	13.5	6.4	7.8	-	-	.8	1.1	-	80	130	328	0	*25	305	.0	695	*3
12	24	62	13.0	6.6	7.9	-	-	.7	1.2	-	83	126	320	-	*25	280	.0	714	5
12	31	62	13.0	6.3	7.9	-	-	.7	1.8	-	94	126	340	-	-	-	-	680	20
1	7	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
1	8	63	12.5	6.0	7.9	-	-	.7	1.8	-	-	-	-	-	-	-	-	-	-
1	16	63	12.5	6.3	7.9	.4	10	1.0	2.0	-	85	126	340	-	*25	270	.0	695	50
1	22	63	12.5	6.3	7.8	.3	-	.7	1.2	-	86	128	340	-	*25	290	.0	690	5
1	29	63	12.5	6.4	7.9	.3	-	.7	1.7	-	78	120	350	-	*25	290	.0	710	*3
2	5	63	13.0	6.4	8.0	.3	-	.7	1.2	-	75	120	340	-	*25	290	.0	710	*3
2	12	63	13.5	6.5	7.8	.7	-	.8	1.8	-	-	-	-	-	-	-	-	-	*3
2	19	63	13.0	6.2	8.0	.4	-	.7	1.7	-	80	128	328	0	*25	275	.0	680	*3
2	26	63	13.5	6.3	7.9	.4	-	.8	1.7	-	79	128	324	5	*25	290	.0	700	*3
3	5	63	13.0	6.1	7.9	.4	-	.8	1.8	-	77	130	320	0	*25	240	.0	710	*3
3	12	63	13.0	6.2	7.9	.5	-	1.2	1.4	-	80	130	320	5	*25	310	.0	720	3000
3	19	63	13.0	6.2	7.9	-	-	1.0	1.9	-	43	128	320	0	*25	280	.0	690	*3
3	26	63	13.0	6.0	7.9	-	-	.8	1.8	-	72	124	330	5	*25	280	.0	690	*33
4	2	63	13.0	5.9	7.9	.2	-	1.2	1.8	-	86	120	330	5	*25	280	.0	720	*3
4	9	63	13.5	6.4	7.9	.5	-	1.2	2.2	-	80	128	320	5	*25	280	.0	670	67
4	16	63	14.0	6.3	7.3	.2	-	1.2	1.8	-	82	128	330	0	*25	300	.0	690	*3
4	23	63	13.0	6.2	7.9	.4	-	.7	1.7	-	96	132	340	5	*25	280	.0	690	*3
4	30	63	14.0	6.8	7.9	.5	-	.2	.8	-	74	124	320	10	*25	280	.0	670	*3
5	7	63	14.0	6.7	7.8	.7	-	.8	2.2	-	82	136	340	0	*25	280	.0	640	30
5	14	63	14.0	6.6	7.9	.4	-	.8	1.8	-	78	128	320	0	*25	290	.0	670	550
5	21	63	14.0	6.8	7.9	.4	-	.7	2.2	-	78	132	320	5	*25	290	.0	640	200
5	28	63	14.0	6.7	7.8	1.7	-	1.2	2.3	-	64	120	360	5	*25	290	.0	690	-
6	4	63	14.0	6.2	7.8	.6	-	1.7	2.8	-	76	128	330	0	*25	280	.0	670	200
6	11	63	14.0	6.8	7.6	.6	-	.7	2.1	-	72	126	320	0	*25	260	.0	650	*3
6	18	63	14.0	6.7	7.9	.2	-	.9	2.2	-	90	126	340	5	*25	270	.0	660	6000

STATE	NEVADA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	LOWER COLORADO RIVER
STATION LOCATION	COLORADO RIVER NEAR BOULDER CITY, NEVADA

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

5

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
6	25	63	14.0	6.9	7.9	.4	-	.9	2.3	-	76	128	340	10	*25	260	.0	670	*33
7	2	63	14.0	6.9	7.8	.8	-	.9	1.7	-	72	118	340	0	*25	280	.0	680	8000
7	9	63	14.0	6.8	7.9	.6	-	1.1	2.2	-	72	122	340	0	*25	270	.0	670	200
7	16	63	14.0	6.6	7.9	.6	-	.7	2.4	-	72	120	340	5	*25	350	.0	710	100
7	23	63	14.0	6.9	7.9	.3	-	.9	-	-	74	122	360	0	*25	250	.0	650	200
7	30	63	14.0	6.7	7.9	.3	-	.7	2.1	-	80	118	310	5	*25	260	.0	650	100
8	6	63	14.0	6.5	7.9	.3	-	.9	1.9	-	90	120	350	5	*25	270	.0	670	100
8	13	63	14.5	6.6	7.8	.6	-	.9	1.9	-	70	130	310	0	*25	260	.0	650	*3
8	20	63	14.5	6.6	7.9	.8	-	.9	2.2	-	72	120	320	0	*25	280	.0	640	3
8	27	63	14.5	6.5	7.9	.8	-	.9	2.1	-	76	120	320	5	*25	270	.0	650	30
9	3	63	14.0	6.3	7.9	.5	-	.9	2.1	-	70	120	380	0	*25	290	.0	660	3
9	10	63	14.0	6.2	8.0	.4	-	.9	2.4	-	74	128	330	5	*25	280	.0	660	33
9	17	63	14.0	6.2	7.8	.8	-	.7	1.7	-	76	124	330	5	*25	290	.0	690	500
9	24	63	14.0	6.3	7.9	.6	-	.9	1.3	-	80	128	310	5	*25	290	.0	630	20

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station below Hoover Dam
Data furnished by U.S. Bureau of Reclamation
through U.S. Geological Survey

STATE Nevada

MAJOR BASIN Colorado River

MINOR BASIN Lower Colorado River

STATION LOCATION Colorado River near Boulder City, Nevada

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	12.300	9.960	8.660	3.300	9.060	11.800	14.700	15.200	11.300	15.000	15.300	5.720
2	9.830	9.360	3.080	8.860	7.150	11.400	14.200	15.300	7.200	14.500	15.000	6.290
3	9.980	8.090	11.500	7.310	3.550	9.330	13.900	14.600	14.000	14.600	11.000	15.600
4	9.180	4.580	11.400	7.230	10.300	14.500	14.400	10.200	13.000	7.370	6.420	13.800
5	10.200	11.900	11.800	5.560	10.300	17.200	15.800	8.020	12.900	14.800	13.900	14.500
6	7.270	11.500	12.000	2.970	11.200	14.800	11.100	15.000	12.700	12.200	13.100	15.500
7	3.040	12.700	12.000	6.260	11.500	14.900	8.510	13.800	12.500	8.650	13.900	11.400
8	10.900	12.700	9.490	6.430	12.100	15.800	16.900	13.700	10.100	16.800	13.800	5.130
9	11.700	12.200	4.530	6.510	11.500	14.600	18.600	13.700	6.630	17.000	14.500	15.000
10	10.900	10.400	11.500	6.710	5.460	10.800	18.000	14.800	13.100	17.800	12.900	16.400
11	12.200	6.070	12.500	8.720	11.000	15.900	18.300	10.800	11.700	17.800	8.780	15.100
12	10.000	10.300	12.200	9.880	11.600	17.000	16.400	8.520	12.500	17.000	15.700	17.600
13	8.070	11.100	11.900	6.840	13.100	17.100	14.800	16.000	13.100	13.400	16.300	14.600
14	3.950	10.900	11.800	10.600	11.800	18.000	8.740	17.300	14.500	9.350	16.000	10.200
15	9.610	11.800	9.600	8.510	13.000	17.300	17.600	17.700	11.400	16.400	16.600	5.450
16	10.800	12.800	5.180	7.490	10.600	14.300	17.500	19.000	9.660	16.400	17.600	12.700
17	12.800	11.100	12.000	10.000	5.260	10.500	18.900	18.700	15.600	16.800	14.200	12.600
18	13.400	5.700	10.800	11.100	13.100	16.200	17.300	16.700	14.700	17.300	9.820	13.800
19	14.100	12.500	11.600	9.440	12.000	15.200	15.700	13.000	14.700	17.400	17.600	12.600
20	9.730	11.800	11.700	5.370	12.400	14.800	13.100	18.500	15.000	12.500	16.800	11.400
21	4.740	12.000	11.600	10.000	14.100	15.400	8.700	17.400	14.000	10.400	15.500	8.630
22	13.900	3.940	9.540	8.450	8.010	14.700	14.600	17.100	11.600	16.000	15.000	4.170
23	14.300	10.800	5.960	8.610	9.880	12.800	14.600	17.400	8.200	16.500	14.300	13.400
24	14.200	9.170	5.760	9.220	4.770	8.310	14.200	16.100	14.400	17.300	11.300	14.700
25	13.600	3.830	5.200	8.820	13.400	15.900	14.600	12.700	16.200	17.200	6.640	14.800
26	13.300	12.200	13.400	7.130	11.000	16.400	14.300	9.620	15.900	16.100	14.700	16.700
27	8.710	11.200	13.500	3.470	11.800	16.200	11.500	17.800	16.400	12.600	15.300	16.200
28	4.900	12.700	13.300	9.520	10.900	15.700	8.320	16.800	17.200	10.600	15.300	10.800
29	12.200	12.300	10.200	9.940		13.900	15.100	16.500	15.500	16.000	15.800	6.710
30	10.800	13.400	5.200	9.200		10.800	15.500	9.470	9.260	16.400	15.500	13.600
31	9.560		6.680	9.690		7.750		18.000		15.700	13.300	

COLORADO RIVER AT PAGE, ARIZONA

The Page, Arizona Water Pollution Surveillance System station is located approximately 5 miles below the Arizona-Utah State line. Samples are taken from the municipal water treatment plant. Moab, Utah, about 150 miles upstream, is the nearest community. The Green River and the San Juan River are both confluent to the Colorado reach above Page and below Loma, Colorado; both tributaries have Surveillance System stations.

Station Location: Colorado River at Page, Arizona

Major Basin: Colorado River

Minor Basin: Middle Colorado River

Station at: 36°56' Latitude 111°26' Longitude

Miles above mouth: 775

Activation Date: November 23, 1959

Sampled by: U.S. Bureau of Reclamation

Field Analysis by: U.S. Bureau of Reclamation
U.S. Public Health Service

Other Cooperating Agencies: Arizona State Department of Health
Utah State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: At Lees Ferry, Arizona

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 107,900 square miles

Period of record: 1911 to present

Average discharge in record period: 17,850 cfs.

Maximum discharge in record period: 220,000 cfs.

Minimum discharge in record period: 750 cfs.

Remarks: Flows affected by irrigation diversion and return flows, transmountain diversions, storage, and power developments.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.52	.50
	Na	205	155
	K	8.3	7.5
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*26	19
	Cd	*13	*10
	As	*75	*75
	B	205	134
	P	*33	48
	Fe	46	101
	Mo	*50	*50
	Mn	*7	*5
	Al	–	*48
	Be	*.3	*.2
	Cu	*13	*5
	Ag	*3	*2
	Ni	*13	*10
	Co	*26	*10
	Pb	*33	*24
	Cr	*7	*24
	V	*13	*48
	Ba	40	48
	Sr	1250	792

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	6.8	1.8	April to June	–	–
January to March	1.5	.2	July to September	4.2	.7

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

STATE	ARIZONA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION	COLORADO RIVER AT PAGE, ARIZONA

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RADIOACTIVITY DETERMINATIONS

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	11	18	62	72	15	10	77	73	650	314	65	32	715	316						
10	8	62	12	18	107	72	11	9	118	73	776	381	55	64	831	386						
10	15	62	11	16	208	88	15	8	223	88	447	197	58	39	505	201						
11	5	62	11	30	12	7	5	5	17	9	86	39	1	35	87	52						
11	13	62	12	18	14	7	7	5	21	9	146	37	54	32	200	46						
11	19	62	12	6	43	15	9	6	52	16	640	50	50	30	690	58						
11	26	62	12	15	37	16	10	5	47	17	93	64	48	26	141	69						
12	3	62	12	31	7	6	11	7	18	9	86	29	46	27	132	40						
12	10	62	1	4	16	7	6	6	22	9	41	37	40	39	81	54						
12	17	62	1	9	17	6	9	6	26	8	37	37	50	42	87	56						
12	31	62	1	15	4	3	13	7	17	8	29	33	29	41	58	53						
1	7	63	1	29	25	19	9	7	34	20	124	23	47	18	171	29						
1	21	63	2	5	6	6	14	9	20	11	34	39	62	41	96	57						
1	28	63	2	11	0	2	14	8	14	8	11	16	42	21	53	26						
2	4	63	2	21	3	4	16	8	19	9	9	37	27	43	36	57						
2	11	63	2	26	0	3	18	9	18	9	8	33	70	45	78	56						
2	18	63	3	11	0	2	5	5	5	5	3	11	66	16	69	19						
2	25	63	3	14	1	2	8	7	9	7	0	70	50	33	50	77						
3	4	63	3	25	1	2	11	6	12	6	12	15	66	21	78	26						
3	11	63	3	27	0	1	7	5	7	5	6	6	49	32	55	32						
3	18	63	4	5	0	0	9	6	9	6	8	5	48	26	56	26						
3	25	63	4	10	0	2	15	8	15	8	0	78	46	34	46	85						
4	1	63	4	15	0	1	5	6	5	6	11	14	42	20	53	24						
4	8	63	4	25	0	2	6	5	6	5	1	29	94	38	95	48						
4	15	63	4	29	4	3	13	7	17	8	11	12	70	17	81	21						
4	22	63	5	15	0	2	9	7	9	7	14	29	59	40	73	49						
4	29	63	5	17	0	3	13	9	13	9	0	38	74	39	74	54						
5	6	63	5	27	0	1	6	4	6	4	2	6	49	17	51	18						
5	13	63	5	31	0	0	9	7	9	7	0	3	67	20	67	20						
5	20	63	6	5	0	0	4	5	4	5	2	6	68	32	70	33						
5	27	63	6	12	0	1	6	6	6	6	4	10	55	32	59	34						
6	3	63	7	1	1	2	9	5	10	5	3	11	52	15	55	19						
6	10	63	7	1	0	1	9	5	9	5	9	11	49	15	58	19						
6	17	63	7	3	0	0	10	8	10	8	7	5	52	34	59	34						
6	24	63	7	15	1	1	8	6	9	6	0	3	32	17	32	17						
7	1	63	7	17	0	0	8	6	8	6	17	5	79	20	96	21						
7	8	63	7	31	0	0	9	5	9	5	7	5	60	28	67	28						
7	15	63	8	7	0	0	2	6	2	6	8	6	130	36	138	36						
7	22	63	8	12	0	0	5	4	5	4	6	3	44	15	50	15						
7	29	63	8	14	0	0	13	6	13	6	5	5	48	18	53	19						

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SANJUAN RIVERS

STATION LOCATION COLORADO RIVER AT PAGE, ARIZONA 60

RADIOACTIVITY DETERMINATIONS

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER															RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA							DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL					ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±		MO.	DAY	pc/g	±	pc/g	±
8	5	63	8	19	6	3	7	5	13	6	32	8	55	15	87	17							
8	12	63	8	27	0	0	11	5	11	5	3	5	45	18	48	19							
8	19	63	9	16	0	1	9	6	9	6	2	3	41	14	43	14							
8	26	63	9	16	1	1	4	5	5	5	7	3	27	17	34	17							
9	9	63	10	1	1	1	3	4	4	4	3	3	28	11	31	11							
9	16	63	10	8	0	0	10	6	10	6	2	5	53	19	55	20							
9	23	63	10	8	1	1	10	5	11	5	6	6	46	18	52	19							
9	30	63	10	17	0	0	5	5	5	5	0	31	41	20	41	37							

ORGANIC CHEMICALS
RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE ARIZONA
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION COLORADO RIVER AT PAGE, ARIZONA 60

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	5	62	11	18	5380	144	100	44	-	-	-	-	-	-	-	-	-	-	-
1	9	63	1	24	5250	180	38	142	-	-	-	-	-	-	-	-	-	-	-
3	4	63	3	16	5000	179	73	106	-	-	-	-	-	-	-	-	-	-	-
5	9	63	5	20	7500	117	52	65	-	-	-	-	-	-	-	-	-	-	-
7	2	63	7	10	5040#	140	62	78	-	-	-	-	-	-	-	-	-	-	-
8	5	63	8	19	3776#	186	79	107	-	-	-	-	-	-	-	-	-	-	-
9	10	63	9	23	7920#	108	48	60	-	-	-	-	-	-	-	-	-	-	-

ESTIMATED

PLANKTON POPULATION

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION COLORADO RIVER AT PAGE, ARIZONA 060

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES																			
			1ST		2ND		3RD		4TH					ROTIFERS											CRUSTACEA								
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)										NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)						NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	1	62										-	-	-											-							-	-
10	15	62										-	-	-											-							-	-
11	5	62	92	20	36	14	79	7	33	7	52	0	*	-											-							-	-
11	18	62	92	34	36	12	85	5	64	5	44	0	*	-											-							-	-
12	3	62										0	*	-											-							-	-
12	10	62										0	*	-											-							-	-
1	2	63	92	71	36	16	65	3	41	2	8	0		0											0							0	0
1	21	63	82	67	92	11	36	3	64	3	16	0		0											0							0	0
2	4	63										0		0											0							0	0
2	18	63	92	29	82	16	65	6	27	4	45	-	-	0											0							0	0
3	4	63	82	26	71	15	70	14	92	9	36	0		0											1							0	0
3	18	63	82	93	91	3	67	1			3	-	-	0											0							0	0
4	1	63	82	80	86	6	26	6	92	4	4	0		3											0							0	0
4	15	63	82	36	27	24	35	10	86	6	24	-	-	286	11	5	21	4	17	4	14	3	46	3	18	72	2	50	2			0	0
5	6	63	35	33	82	27	88	14	92	13	13	-	-	-											-							-	-
5	20	63	36	58	70	15	92	10	71	3	14	-	-	-											-							-	-
6	3	63	35	32	70	11	33	9	91	9	39	-	-	-											-							-	-
6	17	63	67	36	92	11	35	8	91	7	38	-	-	-											-							-	-
7	1	63										-	-	-											-							-	-
7	15	63										-	-	-											-							-	-
8	5	63										-	-	-											-							-	-
8	19	63										-	-	-											-							-	-
9	16	63	65	26	2	10	62	7	33	7	50	-	-	-											-							-	-
9	30	63										-	-	-											-							-	-

PLANKTON POPULATION

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION COLORADO RIVER AT

PAGE, ARIZONA 60

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	*	–	–	–	–	–	–	–	–	–	–																				
10	15	62	*	–	–	–	–	–	–	–	–	–	–																				
11	5	62	100	0	0	30	0	0	0	20	90	60	440																				
11	18	62	1900	0	0	0	0	40	0	330	1530	120	120	92	3	82	1	87	1														
12	3	62	200	0	0	0	0	20	0	0	180	0	230																				
12	10	62	800	0	0	0	0	70	0	480	260	0	480																				
1	2	63	400	0	0	0	0	20	20	60	310	50	420																				
1	21	63	1800	0	0	20	0	260	0	1500	20	90	90	71	4	51	1																
2	4	63	700	0	0	0	0	70	0	590	0	0	20																				
2	18	63	300	0	0	0	0	20	20	180	110	0	70																				
3	4	63	3000	0	40	0	0	20	0	2770	210	40	270	71	5	68	2																
3	18	63	3200	0	0	150	0	90	0	2550	370	180	90	71	5	88	1																
4	1	63	1100	0	20	20	0	60	80	650	250	2460	230	71	2																		
4	15	63	500	0	0	20	0	70	0	70	370	400	150																				
5	6	63	300	0	0	0	0	0	0	20	240	0	30																				
5	20	63	800	0	40	20	0	0	0	0	740	0	170	82	2																		
6	3	63	200	0	0	30	0	0	0	0	210	10	10																				
6	17	63	200	0	0	0	0	0	0	50	160	0	0																				
7	1	63	100	0	20	20	0	0	0	0	40	0	20																				
7	15	63	300	0	0	0	0	0	0	20	240	0	70																				
8	5	63	100	0	0	0	0	0	20	20	100	0	0																				
8	19	63	100	0	0	0	0	0	0	20	90	0	0																				
9	16	63	100	0	0	0	0	0	0	0	110	20	70																				
9	30	63	00	0	0	0	0	0	0	0	20	0	0																				

* TOO TURBID TO COUNT

STATE	ARIZONA
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION	COLORADO RIVER AT PAGE, ARIZONA

60

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	24.0	6.7	7.6	-	-	-	-	-	128	156	780	-	80000	-	-	1051	-
10	8	62	20.0	7.8	8.1	-	-	-	-	-	150	292	660	-	16000	-	-	1256	-
10	15	62	18.0	8.0	8.6	-	-	-	-	.0	95	192	770	0	7000	-	.0	851	-
10	22	62	17.0	-	8.5	-	-	-	-	.0	63	260	540	0	10000	-	.0	1411	-
10	29	62	14.0	9.3	7.9	6.5	-	-	-	.1	81	164	560	0	4250	170	-	995	6000
11	5	62	19.0	9.3	7.6	5.0	-	-	-	.0	120	172	440	7	2000	320	-	708	-
11	12	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*110
11	13	62	22.0	-	8.0	-	-	-	-	.0	88	154	316	5	390	325	.0	938	-
11	18	62	-	-	7.9	-	-	-	-	-	88	144	400	5	440	327	.0	927	
11	19	62	10.0	-	8.0	-	-	-	-	-	-	182	540	0	600	-	-	944	*130
11	26	62	8.9	11.0	8.1	2.4	-	-	-	-	134	164	516	5	700	450	.0	1100	*130
12	3	62	8.5	10.0	8.1	3.4	-	-	-	.0	105	168	470	5	360	475	.0	1015	-
12	10	62	5.2	11.5	8.2	2.2	-	-	-	-	100	172	452	5	270	400	.0	1045	-
12	17	62	4.4	9.8	8.2	1.6	-	-	-	-	134	154	428	0	240	400	.0	1000	300
12	31	62	4.5	12.0	8.0	4.5	-	-	-	-	142	186	540	-	135	500	.0	1190	-
1	7	63	.5	-	7.9	-	-	-	-	-	16	192	488	-	300	400	.0	1165	200
1	21	63	-	-	7.9	-	-	-	-	-	158	224	512	-	*25	450	.0	1265	*40
1	28	63	6.0	-	8.1	-	-	-	-	-	140	232	512	-	*25	450	.0	1130	100
2	4	63	-	-	8.0	-	-	-	-	-	180	204	510	5	*25	400	.0	1160	*40
2	11	63	4.6	10.4	8.0	-	-	-	-	-	150	168	430	5	*25	300	.0	970	*40
2	18	63	3.2	-	7.7	-	-	-	-	-	82	152	392	5	*25	350	.0	880	480
2	25	63	7.0	-	8.3	-	-	-	-	-	96	160	384	5	*25	400	.0	900	5000
3	4	63	9.0	11.5	8.4	3.5	-	-	-	-	120	160	410	5	*25	400	.0	970	50
3	11	63	7.0	11.9	8.5	5.0	-	-	-	-	110	160	410	5	*25	350	.0	930	-
3	18	63	7.6	-	8.9	-	-	-	-	-	112	164	400	5	*25	320	.0	940	*40
3	25	63	8.3	-	8.9	-	-	-	-	-	116	168	420	5	*25	360	.0	1000	*40
4	1	63	11.0	11.3	8.5	1.3	-	-	-	-	104	164	460	5	*25	360	.0	960	*40
4	8	63	12.0	11.0	8.4	1.0	-	-	-	-	-	162	514	0	6	-	-	921	*40
4	15	63	-	-	7.4	-	-	-	-	-	146	160	440	0	*25	440	.0	1040	*40
4	22	63	12.0	11.5	7.5	1.5	-	-	-	-	160	116	460	5	*25	380	.0	1020	200
4	29	63	12.5	-	7.7	-	-	-	-	-	146	152	480	5	*25	380	.0	990	*40
5	6	63	13.0	11.5	8.3	1.3	-	-	-	-	144	152	440	0	*25	360	.0	990	1500
5	13	63	14.0	-	8.3	-	-	-	-	-	136	144	420	5	*25	360	.0	940	-
5	20	63	18.0	10.8	8.3	.8	-	-	-	-	114	148	380	0	*25	350	.2	900	-
5	27	63	15.0	11.3	8.3	1.4	-	-	-	-	104	146	440	15	*25	360	.0	870	5000
6	3	63	14.5	12.6	8.3	1.0	-	-	-	-	114	142	400	5	*25	320	.0	810	*200

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE ARIZONA

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION COLORADO RIVER AT

PAGE, ARIZONA 60

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
6	10	63	17.0	-	7.7	-	-	-	-	-	80	142	380	10	*25	300	.0	760	10
6	17	63	19.0	-	7.5	-	-	-	-	-	106	140	400	10	*25	290	.0	770	1000
6	24	63	18.0	11.6	8.1	1.4	-	-	-	-	95	132	340	5	*25	310	.0	750	*40
7	1	63	18.0	11.7	8.0	2.2	-	-	-	-	95	130	380	5	*25	290	.0	730	*40
7	8	63	20.0	10.2	8.2	-	-	-	-	-	90	128	420	0	*25	280	.0	670	-
7	9	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000
7	15	63	17.0	10.8	8.0	-	-	-	-	-	95	132	360	5	*25	350	.0	710	-
7	16	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*40
7	22	63	20.0	-	8.0	-	-	-	-	-	105	128	340	0	*25	290	.0	690	2000
7	29	63	21.0	11.7	8.2	-	-	-	-	-	100	126	340	5	*25	280	.0	650	50
8	5	63	19.0	-	8.0	-	-	-	-	-	90	130	380	5	190	310	.0	710	7600
8	12	63	18.0	-	8.0	-	-	-	-	-	90	130	360	5	*25	300	.0	680	26000
8	19	63	-	-	-	-	-	-	-	-	84	128	330	0	*25	320	.0	710	-
8	26	63	17.0	-	8.0	-	-	-	-	-	82	128	330	5	*25	310	.0	710	*200
9	9	63	-	-	7.9	-	-	-	-	-	68	128	310	5	*25	300	.0	640	*40
9	16	63	-	-	7.9	-	-	-	-	-	70	124	300	10	*25	280	.0	650	1600
9	23	63	20.0	-	7.8	-	-	-	-	-	-	126	456	0	0	-	-	799	1300
9	30	63	17.0	-	8.0	-	-	-	-	-	-	130	360	0	0	-	-	776	100

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Lees Ferry, Arizona
Operated by U.S. Geological Survey

STATE Arizona

MAJOR BASIN Colorado River

MINOR BASIN Middle Colorado-San Juan Rivers

STATION LOCATION Colorado River at Page, Arizona

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	10.300	8.080	6.410	2.650	4.600	6.130	1.030	1.020	1.010	2.450	1.000	1.000
2	11.000	8.040	6.320	2.700	4.930	6.000	1.030	1.030	1.020	2.470	1.000	1.000
3	9.300	8.040	6.250	2.720	5.140	5.940	1.030	1.020	1.550	2.480	1.010	1.000
4	7.620	7.900	6.190	3.090	5.490	5.970	1.030	1.010	2.470	2.470	1.010	1.000
5	6.440	7.830	6.060	3.240	5.550	5.970	1.040	1.010	2.500	2.470	1.000	1.000
6	6.570	7.940	6.060	3.590	6.350	6.000	1.020	1.010	2.470	2.470	1.000	.990
7	6.740	8.110	6.130	4.060	7.070	5.970	1.020	1.010	2.450	2.470	1.000	.990
8	6.540	7.860	6.100	4.420	7.310	5.850	1.030	1.010	2.450	2.480	1.000	1.000
9	7.140	7.690	6.000	4.680	7.620	5.790	1.020	1.010	2.440	2.500	1.000	1.000
10	7.900	7.550	5.880	4.930	7.580	5.700	1.020	1.000	2.450	1.900	1.000	1.010
11	7.690	7.450	5.850	5.170	7.550	5.530	.990	1.000	2.470	1.040	1.000	1.020
12	7.040	7.240	5.850	4.400	7.620	5.440	.990	1.000	2.480	1.020	1.000	1.020
13	7.040	6.800	5.760	3.300	7.760	4.470	1.010	1.010	2.540	1.000	1.010	1.030
14	7.140	6.540	5.760	3.000	7.800	1.300	1.020	1.020	2.550	1.000	1.010	1.030
15	6.700	6.540	5.760	1.900	7.800	1.260	1.020	1.030	2.550	1.000	1.010	1.030
16	6.770	6.570	5.580	2.000	7.550	1.220	1.010	1.000	2.550	1.000	1.020	1.010
17	6.840	6.770	5.410	2.100	7.480	1.260	.980	1.000	2.520	1.010	1.020	1.000
18	7.210	6.870	5.280	2.300	7.240	1.210	.990	1.020	2.500	1.010	1.030	1.000
19	9.000	7.550	5.250	2.400	7.180	1.080	1.010	1.030	2.500	1.010	1.010	1.000
20	13.500	7.940	5.030	2.500	7.070	1.050	1.010	1.040	2.500	1.010	.980	1.000
21	18.100	7.970	4.780	2.500	6.840	1.060	1.010	1.010	2.500	1.000	.980	1.000
22	16.700	7.620	4.800	1.500	6.510	1.060	1.020	1.010	2.480	1.000	.990	1.000
23	12.200	7.410	4.900	.910	6.510	1.050	1.010	1.020	2.500	1.010	.990	1.000
24	9.760	6.940	5.060	.720	6.510	1.050	1.020	1.010	2.500	1.010	.990	1.000
25	9.270	6.610	5.470	1.450	6.510	1.060	1.020	1.000	2.480	1.010	.990	1.000
26	8.830	6.870	5.610	2.200	6.410	1.050	1.030	1.010	2.480	1.000	.990	1.000
27	8.680	6.740	5.330	2.660	6.380	1.050	1.020	1.000	2.480	1.000	1.000	1.010
28	8.250	6.570	5.200	3.200	6.250	1.040	1.020	1.000	2.480	1.000	1.000	1.010
29	7.800	6.570	4.320	3.650		1.050	1.030	1.010	2.480	1.000	1.000	1.010
30	7.970	6.510	3.610	3.940		1.030	1.020	.980	2.470	.980	1.100	1.010
31	8.100		3.000	4.280		1.040		.990		.980	1.020	

COLORADO RIVER AT LOMA, COLORADO

This is the furthest upstream surveillance station on the Colorado River and is located approximately fifteen river miles above the Colorado-Utah State Line. Samples are collected from the north bank of the river two miles south of Loma.

Irrigated agriculture above the station produces fruit, forage, grains and truck farm products. Upstream industries include uranium plants at Rifle, Grand Junction and Gunnison, and an oil shale extraction plant at Rifle.

A BOD population equivalent of 4,940 is discharged by three upstream communities within twenty-one miles of this station. There is a gasoline and coke refinery one mile upstream.

736-500 O - 64 - 6

Station Location: Colorado River at Loma, Colorado

Major Basin: Colorado River

Minor Basin: Upper Colorado River

Station at: 39°10' Latitude 108°49' Longitude

Miles above mouth: 1,150

Activation Date: April 21, 1958

Sampled by: Mesa County Department of Public Health

Field Analysis by: Grand Junction Water Department
U.S. Public Health Service

Other Cooperating Agencies: Colorado State Department of Public Health

Hydrologic Data:

Nearest pertinent gaging station: Near Colorado-Utah State line

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 17,900 square miles

Period of record: 1951 to present

Average discharge in record period: 5,970 cfs.

Maximum discharge in record period: 56,800 cfs.

Minimum discharge in record period: 960 cfs.

Remarks: Flows influenced by transmountain diversions, power development, storage and irrigation diversions.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.62	.40
	Na	118	72
	K	6.2	4.4
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*10	*6
	Cd	*10	*6
	As	*75	*60
	B	77	36
	P	*48	*30
	Fe	19	*12
	Mo	*58	27
	Mn	*2	*3
	Al	–	*30
	Be	*.2	*.2
	Cu	*5	*3
	Ag	*2	*2
	Ni	*5	*6
	Co	*19	*6
	Pb	*48	*15
	Cr	*5	*15
	V	*10	*30
	Ba	50	23
	Sr	665	366

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.5	.2	April to June	2.5	.3
January to March.	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE COLORADO

MAJOR BASIN COLORADO RIVER

MINOR BASIN UPPER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT LOMA, COLORADO

6

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	10	30	5	5	5	6	10	8	47	63	85	75	132	98						
10	8	62	11	1	2	3	19	9	21	9	5	27	25	39	30	47						
10	24	62	11	16	2	2	4	4	6	4	15	23	32	30	47	38						
10	29	62	12	22	-	-	-	-	-	-	6	22	35	28	41	36						
11	5	62	11	29	0	2	6	6	6	6	166	25	16	30	182	39						
11	13	62	12	18	0	2	7	5	7	5	31	24	69	33	100	41						
11	19	62	12	4	2	2	5	5	7	5	24	24	53	33	77	41						
11	27	62	12	21	4	3	16	7	20	8	13	23	25	31	38	39						
12	5	62	1	10	4	3	11	7	15	8	27	26	34	34	61	43						
12	10	62	1	4	3	3	9	6	12	7	19	23	27	32	46	39						
1	2	63	1	15	6	5	23	10	29	11	45	36	25	43	70	56						
1	7	63	1	21	4	3	13	7	17	7	10	12	19	16	29	20						
1	14	63	1	24	0	6	3	12	3	13	67	62	44	79	111	100						
1	22	63	2	6	18	6	11	7	29	9	52	33	49	41	101	53						
2	5	63	3	4	16	6	7	6	23	8	81	10	74	16	155	19						
2	11	63	2	26	0	6	1	5	1	8	132	41	51	36	183	55						
2	25	63	4	12	6	4	9	6	15	7	57	30	55	38	112	48						
3	6	63	3	28	14	5	9	12	23	13	115	27	87	38	202	47						
3	11	63	3	28	7	4	4	6	11	7	27	25	12	31	39	40						
3	18	63	4	1	8	4	10	7	18	8	41	12	57	17	98	21						
3	29	63	4	18	4	4	2	2	6	4	128	22	60	16	188	27						
4	1	63	4	18	11	5	6	3	17	6	147	21	123	18	270	28						
4	8	63	4	25	4	3	7	5	11	6	46	27	68	31	114	41						
4	15	63	4	29	-	-	-	-	-	-	145	12	69	9	214	15						
4	22	63	5	15	6	3	6	4	12	5	44	26	73	31	117	40						
4	29	63	5	17	10	6	5	4	15	7	128	32	50	29	178	43						
5	6	63	5	24	5	2	4	3	9	4	57	16	50	18	107	24						
5	13	63	6	5	6	4	7	3	13	5	86	18	57	15	143	23						
5	21	63	6	13	8	4	3	3	11	5	90	18	46	15	136	23						
5	28	63	6	12	2	2	4	4	6	4	48	15	65	18	113	23						
6	3	63	6	17	1	2	7	5	8	5	32	11	54	15	86	19						
6	10	63	6	25	3	2	10	5	13	5	26	14	55	18	81	23						
6	18	63	7	1	2	2	5	4	7	4	74	7	68	15	142	17						
6	24	63	7	10	0	1	2	4	2	4	8	6	68	30	76	31						
7	1	63	7	17	2	1	8	7	10	7	14	8	74	39	88	40						
7	8	63	7	31	1	1	16	11	17	11	14	7	77	42	91	43						
7	15	63	8	7	9	5	8	9	17	10	86	19	55	43	141	47						
7	23	63	8	12	25	13	8	9	33	16	126	24	72	21	198	32						
7	29	63	8	12	6	4	26	12	32	13	45	9	58	21	103	23						
8	5	63	8	21	3	5	9	9	12	10	89	23	76	46	165	51						

STATE COLORADO

MAJOR BASIN COLORADO RIVER

MINOR BASIN UPPER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT LOMA, COLORADO 6

RADIOACTIVITY DETERMINATIONS

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
8	13	63	8	27	36	19	13	8	49	21	235	57	65	40	300	70						
8	19	63	9	20	4	3	16	10	20	10	31	14	46	34	77	37						
8	26	63	9	17	5	3	19	11	24	11	23	18	26	42	49	46						
9	4	63	9	25	18	12	0	7	18	14	141	31	56	34	197	46						
9	10	63	10	1	40	21	14	7	54	22	202	85	39	23	241	88						
9	17	63	10	2	4	4	10	10	14	11	24	17	63	44	87	47						
9	23	63	10	8	14	30	5	9	19	31	494	166	59	41	553	171						
9	30	63	10	17	1	1	6	8	7	8	11	8	5	33	16	34						

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Colorado-Utah State Line
Operated by U.S. Geological Survey

STATE	Colorado
MAJOR BASIN	Colorado River
MINOR BASIN	Upper Colorado River
STATION LOCATION	Colorado River at Loma, Colorado

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.710	4.320	3.280	2.600	4.400	2.430	5.500	2.220	7.630	1.960	1.020	4.240
2	3.630	4.810	3.390	2.800	5.000	2.520	5.500	2.160	6.850	1.770	1.060	3.490
3	3.570	4.450	3.450	3.000	4.600	2.560	5.210	2.130	7.270	1.700	1.240	3.430
4	3.910	4.390	3.450	3.200	4.000	2.540	4.390	2.190	7.600	1.630	1.460	3.240
5	4.070	4.220	3.390	3.200	4.000	2.510	3.530	2.740	6.970	1.720	1.780	2.800
6	3.890	4.200	3.350	3.200	4.000	2.480	3.240	4.160	6.640	1.830	2.280	2.740
7	3.850	4.160	3.370	3.200	4.000	2.360	3.300	5.740	6.140	1.880	2.880	3.260
8	3.870	3.930	3.280	3.000	4.000	2.440	3.630	7.390	5.770	1.860	3.150	3.300
9	3.890	3.830	3.370	2.600	3.600	2.360	4.140	8.350	5.700	1.740	2.970	3.390
10	3.690	3.770	3.430	2.400	3.400	2.340	4.180	10.100	5.920	1.980	2.860	3.400
11	3.910	3.830	3.170	2.400	3.400	2.380	3.950	9.850	5.770	2.060	2.690	3.200
12	3.950	3.830	3.040	2.200	3.400	2.380	3.430	9.620	5.020	2.430	2.900	3.000
13	3.910	3.790	2.950	2.000	3.000	2.400	3.060	9.270	4.370	2.360	3.130	2.800
14	3.850	3.730	2.970	1.800	2.600	2.400	3.280	8.380	4.560	2.280	3.040	2.600
15	4.010	3.830	2.800	2.200	2.600	2.320	3.830	8.350	5.210	2.430	2.570	2.600
16	3.990	4.320	2.570	2.200	2.800	2.440	4.260	7.240	5.820	2.030	2.060	2.600
17	4.810	4.490	2.600	2.200	2.600	2.280	3.890	8.110	5.940	1.810	1.760	2.600
18	4.430	4.450	2.800	2.400	2.480	2.300	3.110	8.990	6.240	1.560	1.730	2.400
19	4.830	4.280	3.000	2.400	2.490	2.400	2.660	10.400	5.840	1.350	1.780	2.400
20	5.170	3.790	3.200	2.400	2.610	2.400	2.460	11.000	5.970	1.310	2.050	2.600
21	5.040	3.890	3.200	2.400	2.360	2.340	2.130	10.700	5.360	1.260	2.090	3.400
22	5.000	3.790	3.200	2.400	2.340	2.430	1.960	10.700	4.900	1.310	2.150	2.600
23	4.760	3.790	3.000	2.600	2.300	2.970	1.790	9.590	4.520	1.850	2.510	2.400
24	4.050	3.650	2.800	2.600	2.320	3.770	1.620	9.110	4.050	1.740	2.380	2.400
25	4.050	3.550	2.600	2.600	2.410	4.320	1.530	9.240	3.670	1.580	2.540	2.200
26	4.390	3.550	2.200	2.600	2.570	4.410	1.590	8.680	3.200	1.610	2.520	2.200
27	4.490	3.550	1.800	2.600	2.490	4.280	2.020	7.960	2.860	1.500	2.710	2.000
28	4.300	3.510	1.800	2.600	2.460	4.260	2.830	7.660	2.540	1.490	3.320	2.000
29	4.280	3.470	1.800	2.800		4.760	3.100	7.630	2.280	1.320	3.650	2.000
30	4.200	3.410	2.000	3.400		5.800	2.640	7.690	2.170	1.190	3.470	1.900
31	4.220		2.200	3.800		5.800		7.600		1.110	4.300	

PLANKTON POPULATION

STATE COLORADO
MAJOR BASIN COLORADO RIVER
MINOR BASIN UPPER COLORADO RIVER
STATION LOCATION COLORADO RIVER AT
LOMA, COLORADO

006

DATE OF SAMPLE MONTH	DAY	YEAR	DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes) 1ST SPECIES	1ST PERCENT	2ND SPECIES	2ND PERCENT	3RD SPECIES	3RD PERCENT	4TH SPECIES	4TH PERCENT	OTHER SPECIES PERCENT	FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES: ROTIFERS NUMBER PER LITER	ROTIFERS GENERA AND COUNT LEVEL (See text for Codes) 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	CRUSTACEA NUMBER PER LITER	CRUSTACEA GENERA AND COUNT LEVEL (See text for Codes) 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	1	62	32	19	16	16	65	15	92	10	40	-	-	-											-							-	-
10	15	62	92	25	33	24	64	10	86	5	36	-	-	0											0							0	0
11	5	62	92	30	33	22	36	13	16	7	28	-	-	0											0							0	1
11	19	62	33	26	36	25	92	22	64	5	22	190	-	0											0							1	0
12	5	62	92	38	36	33	33	18	65	3	8	-	-	2											0							0	0
12	17	62	92	34	36	21	54	11	71	5	29	20	-	0											0							0	0
1	7	63	92	51	36	16	33	13	65	6	14	-	-	0											0							0	0
1	22	63	92	21	2	11	46	8	33	7	53	-	-	0											0							0	0
2	5	63										-	-	-											-							-	-
3	6	63	65	32	31	20	36	15	92	10	23	-	-	0											0							0	0
3	18	63	65	32	86	28	51	12	92	10	18	-	-	1											0							1	0
4	1	63	92	23	53	7	12	6	36	5	59	-	-	0											0							0	0
4	15	63										-	-	-											-							-	-
5	6	63	65	56	92	10	86	8	36	5	21	-	-	-											-							-	-
5	21	63	65	41	31	9	51	8	36	6	36	40	-	-											-							-	-
6	3	63	65	25	61	8	86	8	70	8	51	-	-	-											-							-	-
6	17	63	65	21	36	9	70	8	51	7	55	-	-	-											-							-	-
7	1	63	65	15	51	14	15	12	26	9	50	-	-	-											-							-	-
7	15	63										-	-	-											-							-	-
8	5	63										-	-	-											-							-	-
8	19	63										-	-	-											-							-	-
9	17	63	26	10	70	10	2	8	64	6	66	-	-	-											-							-	-

PLANKTON POPULATION

STATE COLORADO

MAJOR BASIN COLORADO RIVER

MINOR BASIN UPPER COLORADO RIVER

STATION LOCATION COLORADO RIVER AT LOMA, COLORADO 6

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS			
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE
10	1	62	400	0	0	60	0	0	0	40	270	0	900
10	15	62	1500	0	0	50	0	20	0	90	1350	0	990
11	5	62	900	0	0	0	0	0	0	20	900	0	810
11	19	62	3300	0	0	0	0	20	0	0	3230	0	210
12	5	62	800	0	0	0	0	0	0	0	790	0	630
12	17	62	3700	0	20	20	0	0	0	0	3680	0	1070
1	7	63	400	0	0	0	0	0	0	0	400	0	440
1	22	63	100	0	0	0	0	30	0	20	50	0	180
2	5	63	700	0	0	0	0	0	0	0	660	20	1410
3	6	63	900	0	40	0	0	40	20	20	740	40	1200
3	18	63	600	0	0	0	0	0	0	0	570	0	1080
4	1	63	1800	0	0	0	0	20	0	20	1720	20	3300
4	15	63	1500	0	0	20	0	0	0	130	1340	0	1720
5	6	63	3300	0	0	0	0	0	0	0	3320	0	2860
5	21	63	3300	0	0	0	0	20	20	110	3190	40	2100
6	3	63	500	0	0	0	0	20	0	20	440	20	1210
6	17	63	1100	0	60	20	0	20	0	110	860	0	460
7	1	63	4300	0	40	570	0	90	110	660	2790	200	460
7	15	63	3600	0	0	200	0	90	0	1060	2290	180	1390
8	5	63	*	-	-	-	-	-	-	-	-	-	-
8	19	63	2400	0	0	750	0	20	0	1040	620	60	310
9	17	63	1500	0	0	430	0	50	0	290	770	50	860

* TOO TURBID TO COUNT

DATE OF SAMPLE			MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62																				
10	15	62	92	2	81	2	87	1														
11	5	62	92	1	81	1																
11	19	62	81	3	82	3	92	3	87	1	85	1										
12	5	62	92	1	82	1																
12	17	62	92	4	82	3	86	2	88	1	87	1	78	1								
1	7	63																				
1	22	63																				
2	5	63																				
3	6	63	87	1																		
3	18	63	87	1	91	1																
4	1	63	92	2	87	1																
4	15	63																				
5	6	63	87	4	92	2	91	2	88	1												
5	21	63	87	4	81	2	85	2	82	1	91	1	92	1								
6	3	63	87	1	88	1																
6	17	63	87	1	88	1																
7	1	63	87	3	79	2	85	2	38	2	81	1										
7	15	63	38	1																		
8	5	63																				
8	19	63	38	3																		
9	17	63	38	2	87	1	68	1	88	1												

STATE	COLORADO
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	UPPER COLORADO RIVER
STATION LOCATION	COLORADO RIVER AT LOMA, COLORADO

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

6

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	14.0	7.0	8.4	2.6	44	-	-	.1	132	180	576	10	170	575	.0	1210	40000
10	8	62	13.0	7.7	7.8	2.4	-	-	-	1.1	107	164	500	5	*25	410	.0	1040	2000
10	15	62	12.0	6.8	7.9	2.0	-	-	-	.9	100	156	470	5	*25	320	.0	986	13000
10	24	62	-	-	8.1	-	-	-	-	-	94	160	456	5	*25	400	.0	872	-
10	29	62	10.0	8.0	7.8	1.8	-	-	-	1.0	91	150	430	5	*25	425	.0	1000	3800
11	5	62	9.0	8.8	8.2	4.7	-	-	-	.9	86	156	328	5	*25	325	.0	962	3800
11	13	62	-	-	7.7	-	-	-	-	-	110	156	490	5	*25	375	.0	1000	7200
11	19	62	5.0	9.2	8.4	3.9	-	-	-	.3	78	130	408	0	*25	400	.0	865	-
11	21	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5300
11	27	62	.5	7.8	8.4	2.1	-	-	-	1.0	75	164	480	0	*25	475	.0	990	7000
12	5	62	-	-	8.1	-	-	-	-	-	109	166	480	0	*25	475	.0	985	-
12	10	62	2.0	9.5	8.5	3.1	62	-	-	.8	85	162	424	0	*25	375	.0	960	7800
1	2	63	-	-	7.9	-	-	-	-	-	149	225	600	-	*25	500	.0	1190	-
1	7	63	2.0	10.2	8.1	4.0	-	-	-	1.6	116	168	224	-	*25	350	.0	910	8500
1	14	63	.1	-	8.2	-	-	-	-	9.5	302	336	990	-	*25	1000	.0	2425	*200
1	22	63	.0	9.2	8.2	3.2	-	-	-	3.0	166	194	520	-	*25	500	.0	1270	4000
2	5	63	-	-	7.9	-	-	-	-	-	85	148	330	20	320	450	.0	870	-
2	11	63	-	-	7.9	-	-	-	-	-	120	164	440	10	400	450	.0	950	-
2	25	63	5.0	8.9	7.8	3.2	-	-	-	1.1	130	164	456	0	*25	400	.0	1040	20000
3	6	63	-	-	7.5	-	-	-	-	-	130	150	420	5	*25	350	.0	1030	-
3	11	63	-	-	7.8	-	-	-	-	-	140	160	440	0	*25	400	.0	1110	-
3	18	63	7.0	9.5	8.5	3.1	-	-	-	-	160	152	432	0	*25	380	.0	1030	-
3	29	63	-	-	7.0	-	-	-	-	-	65	152	340	10	310	220	.0	630	-
4	1	63	11.0	7.4	8.0	4.1	-	-	-	.5	75	124	300	20	260	200	.0	580	8200
4	8	63	12.0	7.2	8.4	6.3	-	-	-	.5	80	132	360	5	95	260	.0	710	10000
4	15	63	15.0	7.6	8.2	4.6	-	-	-	1.0	56	136	320	15	250	240	.0	621	20000
4	22	63	8.0	8.6	8.4	4.8	-	-	-	.3	105	132	420	5	180	340	.0	830	10000
4	29	63	11.0	7.6	8.3	3.8	-	-	-	.6	80	148	380	5	260	280	.0	720	9400
5	6	63	17.0	6.6	8.1	3.4	-	-	-	1.0	95	124	380	15	130	280	.0	740	8200
5	13	63	13.0	-	7.9	-	-	-	-	.0	40	108	260	10	115	140	.0	410	-
5	21	63	13.0	7.4	7.8	2.5	-	-	-	.6	25	104	240	10	90	135	.0	360	27000
5	28	63	16.0	6.8	8.4	3.9	-	-	-	.6	45	114	340	10	*25	240	.0	530	-
6	3	63	16.0	7.6	8.4	5.6	-	-	-	.2	50	104	340	5	*25	240	.0	560	4800
6	10	63	15.0	7.0	8.3	1.4	-	-	-	.2	60	122	440	15	*25	280	.0	660	35000
6	18	63	20.0	.0	8.4	-	-	-	-	.6	80	122	340	10	*25	280	.0	630	-
6	24	63	19.0	7.4	8.4	4.8	-	-	-	.2	74	128	410	10	*25	340	.0	730	20000
7	1	63	20.0	7.2	8.6	3.2	-	-	-	1.6	110	142	550	0	*25	500	.0	1130	3200
7	8	63	21.0	7.0	8.5	4.5	-	-	-	-	130	168	880	5	0	690	.0	1410	3800

STATE COLORADO
MAJOR BASIN COLORADO RIVER
MINOR BASIN UPPER COLORADO RIVER
STATION LOCATION COLORADO RIVER AT
LOMA, COLORADO 6

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
7	15	63	-	-	-	-	-	-	-	-	98	178	660	5	530	710	.0	1360	15000
7	23	63	-	-	-	-	-	-	-	-	140	168	730	10	280	740	.0	1520	-
7	29	63	23.0	6.6	8.6	1.5	-	-	-	3.6	140	186	800	10	225	800	.0	1590	670
8	5	63	22.0	5.4	7.8	2.8	-	-	-	1.7	166	184	850	20	450	950	.0	1830	200000
8	13	63	23.0	5.9	8.9	2.8	-	-	-	.2	160	250	800	20	1200	770	.0	1730	20000
8	19	63	-	-	-	-	-	-	-	-	130	190	780	10	240	770	.0	1600	-
8	26	63	21.0	6.3	8.6	1.9	-	-	-	.7	140	190	720	0	325	720	.0	1440	-
9	4	63	-	-	-	-	-	-	-	-	80	180	740	0	600	630	.0	1300	-
9	10	63	21.0	5.0	8.3	3.0	-	-	-	.6	135	200	720	10	900	650	.0	1450	300000
9	17	63	-	-	-	-	-	-	-	-	145	180	640	10	120	620	.0	1320	24000
9	23	63	21.0	4.2	8.6	2.4	-	-	-	.1	150	176	640	10	2400	650	.0	1300	71000
9	30	63	17.0	6.6	8.5	1.5	-	-	-	.8	175	168	640	5	*25	680	.0	1350	12000

GREEN RIVER AT DUTCH JOHN, UTAH

The Public Health Service Water Pollution Surveillance System station at Dutch John, Utah is about 30 miles downstream from the Wyoming-Utah State line. Samples are collected at Flaming Gorge dam powerhouse. Downstream, the Green River enters and flows in Colorado for a short distance before re-entering Utah and proceeding to its confluence with the Colorado in southeast Utah.

The nearest municipal discharge is about 90 miles upstream at Green River, Wyoming, with a BOD population equivalent of 1,260 from a sewered population of 4,200. Grazing of sheep and cattle is a major land use. A large portion of the irrigated cropland is in Wyoming. Principal crops are alfalfa, natural hay, oats and clover.

Station Location:	Green River at Dutch John, Utah
Major Basin:	Colorado River
Minor Basin:	Green River
Station at:	40°54' Latitude 109°26' Longitude
Miles above mouth:	403
Activation Date:	July 9, 1962
Sampled by:	Bureau of Reclamation
Field Analysis by:	U.S. Public Health Service
Other Cooperating Agencies:	Utah Water Pollution Control Board

Hydrologic Data:

Nearest pertinent gaging station:	Near Greendale, Utah
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	15,100 square miles
Period of record:	1950 to present
Average discharge in record period:	2,107 cfs.

Maximum discharge in record period: 19,600 cfs.

Minimum discharge in record period: 208 cfs.

Remarks: Irrigation diversions upstream.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/1

ELEMENTAL ANALYSES

		Composite Interval	
		10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.36	.50
	Na	72	40
	K	3.0	2.8
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*12	11
	Cd	*6	*7
	As	*59	*73
	B	106	161
	P	*15	*37
	Fe	109	18
	Mo	*12	95
	Mn	*3	15
	Al	–	*15
	Be	*.15	*.18
	Cu	*6	11
	Ag	*1.2	*2.2
	Ni	*6	7
	Co	*12	11
	Pb	*15	*18
	Cr	*3	*18
	V	*6	*37
	Ba	21	11
	Sr	398	372

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.2	.2	April to June	–	–
January to March	–	–	July to September	2.7	.3

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

STATE UTAH

MAJOR BASIN COLORADO RIVER

RADIOACTIVITY DETERMINATIONS

MINOR BASIN GREEN RIVER

STATION LOCATION GREEN RIVER AT DUTCH JOHN, UTAH 121

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER															RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA							DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL					ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±		MO.	DAY	pc/g	±	pc/g	±
10	1	62	10	24	0	1	2	3	2	3	9	11	25	16	34	19							
10	8	62	11	1	0	1	6	4	6	4	14	12	31	17	45	21							
10	15	62	11	9	0	2	1	3	1	4	42	28	25	31	67	42							
10	22	62	11	16	0	1	4	3	4	3	10	12	22	17	32	21							
11	5	62	12	10	0	1	3	3	3	3	19	13	20	20	39	24							
11	14	62	12	4	0	1	1	2	1	2	7	11	34	17	41	20							
11	19	62	12	3	0	1	4	3	4	3	56	11	34	14	90	18							
12	3	62	1	10	1	1	4	4	5	4	6	12	26	19	32	22							
12	10	62	1	3	0	1	3	4	3	4	7	12	9	18	16	22							
12	17	62	1	11	0	1	4	4	4	4	4	10	13	16	17	19							
12	26	62	1	14	2	2	4	4	6	4	9	11	30	15	39	19							
12	31	62	1	14	0	1	3	4	3	4	0	24	17	9	17	26							
1	7	63	2	8	-	-	-	-	-	-	10	10	28	15	38	18							
1	14	63	1	30	0	1	3	4	3	4	1	12	15	19	16	24							
1	21	63	2	8	0	1	5	4	5	4	10	10	8	16	18	19							
1	28	63	2	14	0	1	9	5	9	5	22	12	44	19	66	22							
2	4	63	2	18	0	1	5	4	5	4	8	6	17	9	25	11							
2	11	63	2	26	0	1	5	4	5	4	10	13	38	20	48	24							
2	18	63	3	4	0	1	6	4	6	4	2	6	37	9	39	11							
2	25	63	3	11	0	1	7	4	7	4	6	6	46	9	52	11							
3	4	63	3	20	1	2	3	4	4	4	17	22	54	30	71	37							
3	11	63	3	27	1	1	6	3	7	3	12	12	34	18	46	22							
3	18	63	4	1	0	1	6	4	6	4	0	23	36	9	36	25							
3	25	63	4	8	0	1	4	3	4	3	23	6	26	8	49	10							
4	29	63	5	31*	0	1	8	5	8	5	0	28	35	10	35	30							
5	27	63	6	25*	0	1	3	4	3	4	0	46	38	18	38	49							
6	24	63	8	6*	0	0	3	3	3	3	1	6	26	17	27	18							
7	29	63	8	23*	0	0	2	3	2	3	3	6	25	17	28	18							
8	26	63	10	14*	0	0	4	3	4	3	0	3	26	9	26	9							
9	30	63	11	20*	0	0	3	4	3	4	4	4	37	13	41	14							

PLANKTON POPULATION

STATE UTAH
MAJOR BASIN COLORADO RIVER
MINOR BASIN GREEN RIVER
STATION LOCATION GREEN RIVER AT DUTCH JOHN, UTAH 121

Date of Sample: Month	Day	Year	Dominant Species of Diatoms and Percent of Total Diatoms (See text for Codes): 1st Species	1st Percent	2nd Species	2nd Percent	3rd Species	3rd Percent	4th Species	4th Percent	Other Species Percent	Fungi and Sheathed Bacteria Number per ml.	Protozoa (Identifiable) Number per ml.	Microinvertebrates: Rotifers: Number per Liter	Rotifers Genera and Count Level (See text for Codes): 1st Genus	1st Count Level	2nd Genus	2nd Count Level	3rd Genus	3rd Count Level	4th Genus	4th Count Level	5th Genus	5th Count Level	Crustacea: Number per Liter	Crustacea Genera and Count Level (See text for Codes): 1st Genus	1st Count Level	2nd Genus	2nd Count Level	3rd Genus	3rd Count Level	Nematodes (Identifiable) Number per liter	Other Animal Forms (Number per liter)
10	1	62	92	51	15	11	65	4	51	3	31	–	–	0											0							0	1
10	15	62	92	69	15	6	41	5	16	4	16	–	–	0											0							0	0
11	5	62	92	75	36	3	65	2	78	2	18	–	–	0											0							0	0
11	19	62	92	32	41	27	15	10	71	5	26	–	–	0											0							0	0
12	3	62	92	68	36	10	41	8	34	2	12	–	–	0											0							0	0
12	10	62	92	38	34	14	64	6	41	5	37	150	0	0											0							0	0
1	7	63	82	77	35	11	26	3	71	3	6	–	–	0											0							0	0
1	21	63	82	47	86	12	92	12	64	5	24	–	–	0											0							0	0
2	4	63	82	59	51	9	36	7	70	5	20	–	–	1											0							0	0
2	18	63	82	39	36	16	92	9	51	6	30	–	–	0											0							0	0
3	4	63	82	59	35	27	92	7	91	2	5	–	–	0											0							0	0
3	18	63	82	73	35	14	92	4	64	2	7	–	–	2											0							0	0
4	1	63	82	39	35	32	92	11	51	10	8	–	–	1											0							0	0
4	15	63	82	77	35	20	2	1	16	1	1	–	–	0											0							0	0
5	6	63	35	73	82	17	51	3	27	2	5	–	–	–											–							–	–
5	20	63	35	51	82	25	86	17	51	3	4	–	–	–											–							–	–
6	3	63										–	–	–											–							–	–
6	17	63	35	61	51	11	82	9	9	5	14	–	–	–											–							–	–
8	5	63										–	–	–											–							–	–
8	19	63										–	–	–											–							–	–
9	4	63										–	–	–											–							–	–
9	16	63										–	–	–											–							–	–

PLANKTON POPULATION

STATE UTAH

MAJOR BASIN COLORADO RIVER

MINOR BASIN GREEN RIVER

STATION LOCATION GREEN RIVER AT DUTCH JOHN, UTAH 121

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	200	0	0	10	0	0	0	10	200	10	290																				
10	15	62	1000	0	0	0	0	40	0	0	950	80	40	92	3																		
11	5	62	100	0	0	0	0	0	0	0	140	0	110																				
11	19	62	200	0	20	20	0	0	0	0	140	0	470																				
12	3	62	400	0	0	0	0	0	0	0	360	20	340	92	1																		
12	10	62	200	0	0	0	0	0	0	20	140	0	120																				
1	7	63	500	0	0	0	0	60	0	390	0	30	0	71	2																		
1	21	63	400	0	0	0	0	0	0	370	40	20	0	71	2																		
2	4	63	300	0	0	0	0	20	0	180	60	30	0	71	1																		
2	18	63	300	0	0	0	0	20	20	290	0	0	20	71	1																		
3	4	63	2800	20	0	40	0	90	20	2380	240	40	70	71	4	82	1																
3	18	63	1800	0	0	0	0	40	0	1600	170	110	60	71	4																		
4	1	63	500	0	0	0	0	40	0	350	150	40	70	71	2																		
4	15	63	2000	0	20	40	0	20	80	1600	250	1240	130	71	4	77	1																
5	6	63	500	0	0	0	0	0	0	70	460	40	110	82	1																		
5	20	63	1100	0	0	0	0	0	20	190	900	610	130	77	2	82	2																
6	3	63	300	0	0	0	0	0	0	180	150	0	150																				
6	17	63	1300	0	0	0	0	0	130	130	1090	0	40	82	3	77	1	93	1														
8	5	63	100	0	30	30	0	0	0	0	100	30	0																				
8	19	63	100	0	0	20	0	0	0	20	40	0	20																				
9	4	63	200	0	20	140	0	0	0	0	70	0	20																				
9	16	63	200	0	0	20	0	0	0	0	180	20	20																				

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE UTAH
MAJOR BASIN COLORADO RIVER
MINOR BASIN GREEN RIVER
STATION LOCATION GREEN RIVER AT
DUTCH JOHN, UTAH 121

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	1	62	-	-	8.2	-	-	-	-	-	23	136	250	5	*25	230	.0	514	-
10	8	62	-	-	8.3	-	-	-	-	-	20	140	290	5	*25	280	.0	576	-
10	15	62	-	-	8.2	-	-	-	-	-	18	152	320	0	*25	265	.0	600	-
10	22	62	-	-	8.4	-	-	-	-	-	22	148	312	0	*25	260	.0	592	-
10	29	62	-	-	8.1	-	-	-	-	-	12	150	290	0	*25	260	.0	647	-
11	14	62	-	-	8.2	-	-	-	-	-	39	172	276	0	*25	230	.0	595	-
11	19	62	-	-	8.2	-	-	-	-	-	17	170	284	0	*25	260	.0	570	-
11	26	62	-	-	8.3	-	-	-	-	-	13	180	288	0	*25	260	.0	577	-
12	3	62	-	-	8.3	-	-	-	-	-	21	186	330	0	*25	270	.0	665	-
12	10	62	-	-	8.3	-	-	-	-	-	18	204	560	0	*25	260	.0	660	-
12	17	62	-	-	8.4	-	-	-	-	-	27	190	336	0	*25	315	.2	700	-
12	26	62	-	-	8.2	-	-	-	-	-	34	208	356	-	*25	305	.0	710	-
12	31	62	-	-	8.1	-	-	-	-	-	21	166	370	-	*25	275	.0	635	-
1	7	63	-	-	8.3	-	-	-	-	-	26	180	332	-	*25	270	.0	660	-
1	14	63	-	-	8.2	-	-	-	-	-	25	190	336	-	*25	290	.0	675	-
1	21	63	-	-	8.2	-	-	-	-	-	15	184	332	-	*25	270	.0	655	-
1	28	63	-	-	8.2	-	-	-	-	-	22	190	350	-	*25	280	.0	680	-
2	9	63	-	-	8.2	-	-	-	-	-	21	190	370	-	*25	300	.0	690	-
2	11	63	-	-	8.1	-	-	-	-	-	20	196	400	5	65	300	.0	700	-
2	18	63	-	-	8.0	-	-	-	-	-	19	184	336	0	*25	300	.0	650	-
2	25	63	-	-	7.9	-	-	-	-	-	23	184	340	5	*25	300	.0	660	-
3	4	63	-	-	8.2	-	-	-	-	-	25	160	308	5	*25	290	.0	640	-
3	11	63	-	-	8.0	-	-	-	-	-	26	160	320	5	*25	300	.0	640	-
3	18	63	-	-	7.6	-	-	-	-	-	26	172	320	5	*25	280	.0	630	-
3	25	63	-	-	7.4	-	-	-	-	-	24	188	340	5	*25	290	.0	670	-
4	1	63	-	-	7.4	-	-	-	-	-	28	176	360	5	*25	290	.0	650	-
4	5	63	-	-	7.7	-	-	-	-	-	28	176	370	5	*25	300	.0	660	-
4	15	63	-	-	7.4	-	-	-	-	-	26	180	340	5	*25	290	.0	660	-
4	22	63	-	-	7.5	-	-	-	-	-	21	188	370	5	*25	280	.0	670	-
4	29	63	-	-	-	-	-	-	-	-	27	184	360	5	*25	300	.0	660	-
5	6	63	-	-	-	-	-	-	-	-	29	188	370	5	*25	290	.0	670	-
5	13	63	-	-	-	-	-	-	-	-	27	180	350	5	*25	310	.0	670	-
5	20	63	-	-	-	-	-	-	-	-	24	180	340	10	*25	280	.0	670	-
5	27	63	-	-	-	-	-	-	-	-	20	180	370	5	*25	310	.0	630	-
6	3	63	-	-	-	-	-	-	-	-	27	178	350	5	*25	290	.0	650	-
6	10	63	-	-	-	-	-	-	-	-	30	158	350	10	*25	280	.0	640	-
6	17	63	-	-	-	-	-	-	-	-	27	180	360	10	*25	280	.0	680	-
6	24	63	-	-	-	-	-	-	-	-	25	158	320	15	*25	300	.0	680	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE UTAH

MAJOR BASIN COLORADO RIVER

MINOR BASIN GREEN RIVER

STATION LOCATION GREEN RIVER AT DUTCH JOHN, UTAH 121

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	-	-	-	-	-	-	-	-	21	172	350	0	*25	280	.0	650	-
7	8	63	-	-	-	-	-	-	-	-	25	166	350	0	*25	300	.0	680	-
7	15	63	-	-	-	-	-	-	-	-	25	174	320	10	*25	320	.0	620	-
7	22	63	-	-	-	-	-	-	-	-	24	170	380	0	*25	300	.0	650	-
7	29	63	-	-	-	-	-	-	-	-	32	166	330	5	*25	280	.0	640	-
8	5	63	-	-	-	-	-	-	-	-	30	168	350	5	*25	290	.0	630	-
8	12	63	-	-	-	-	-	-	-	-	30	170	320	5	*25	310	.0	600	-
8	19	63	-	-	-	-	-	-	-	-	34	174	340	5	*25	310	.0	660	-
8	26	63	-	-	-	-	-	-	-	-	36	172	330	5	*25	300	.0	640	-
9	3	63	-	-	-	-	-	-	-	-	23	170	340	0	*25	290	.0	640	-
9	9	63	-	-	-	-	-	-	-	-	26	140	400	5	*25	310	.0	620	-
9	16	63	-	-	-	-	-	-	-	-	28	176	330	5	*25	310	.0	640	-
9	23	63	-	-	-	-	-	-	-	-	29	184	330	5	*25	300	.0	630	-
9	30	63	-	-	-	-	-	-	-	-	29	176	360	5	*25	300	.0	640	-

736-500 O - 64 - 7

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Greendale, Utah
Operated by U.S. Geological Survey

STATE Utah

MAJOR BASIN Colorado River

MINOR BASIN Green River

STATION LOCATION Green River at Dutch John, Utah

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.702	.392	.080	.447	.374	.134	.158	.158	.152	.122	.098	.115
2	.698	.113	.080	.389	.374	.137	.158	.134	.152	.115	.098	.113
3	.712	.098	.080	.347	.374	.142	.169	.134	.147	.104	.098	.102
4	.712	.115	.080	.347	.374	.142	.172	.134	.144	.102	.098	.089
5	.717	.103	.080	.351	.370	.134	.141	.134	.127	.104	.098	.080
6	.750	.085	.082	.351	.370	.109	.115	.134	.120	.104	.098	.089
7	.750	.085	.084	.351	.370	.098	.117	.134	.120	.106	.096	.104
8	.774	.089	.084	.355	.419	.098	.117	.139	.122	.109	.094	.104
9	.798	.094	.084	.355	.497	.096	.117	.137	.122	.109	.098	.098
10	.803	.096	.125	.362	.497	.096	.117	.134	.122	.106	.100	.094
11	.794	.098	.137	.366	.501	.094	.117	.134	.122	.104	.100	.092
12	.789	.076	.137	.366	.501	.092	.111	.132	.122	.104	.100	.095
13	.784	.040	.137	.366	.505	.092	.100	.134	.122	.104	.100	.102
14	.774	.040	.137	.362	.505	.094	.100	.132	.120	.104	.100	.100
15	.774	.040	.137	.362	.497	.094	.098	.124	.117	.106	.102	.102
16	.779	.059	.137	.362	.510	.094	.098	.120	.117	.106	.105	.102
17	.774	.072	.320	.366	.510	.094	.098	.115	.120	.106	.106	.100
18	.774	.072	.451	.366	.514	.094	.096	.117	.122	.106	.106	.108
19	.779	.075	.451	.366	.514	.096	.123	.117	.120	.111	.104	.124
20	.789	.078	.451	.366	.518	.082	.150	.120	.117	.111	.096	.127
21	.803	.075	.451	.366	.518	.098	.144	.120	.117	.111	.092	.129
22	.798	.075	.455	.366	.518	.082	.134	.120	.120	.111	.094	.132
23	.803	.075	.455	.366	.522	.096	.137	.120	.122	.109	.098	.132
24	.818	.077	.459	.366	.527	.096	.139	.120	.127	.111	.102	.134
25	.818	.077	.459	.370	.527	.098	.150	.122	.132	.102	.104	.173
26	.808	.077	.451	.370	.531	.096	.150	.122	.129	.091	.104	.154
27	.808	.078	.447	.374	.535	.069	.147	.117	.117	.091	.104	.122
28	.803	.082	.447	.378	.317	.082	.147	.117	.117	.091	.111	.120
29	.803	.082	.447	.378		.108	.179	.129	.117	.091	.113	.122
30	.803	.082	.447	.378		.169	.212	.169	.122	.091	.115	.124
31	.798		.447	.374		.169		.163		.092	.115	

SAN JUAN RIVER AT SHIPROCK, NEW MEXICO

The Surveillance System station at Shiprock is about 22 miles upstream from the point where the San Juan enters Utah after flowing through Colorado for about three miles near the Four Corners area. Samples are collected just upstream from the water intake for the U.S. Bureau of Mines' helium plant. Several small communities are located above the surveillance station. Farmington, New Mexico with a population of about 25,000 is 59 miles upstream. Extensive irrigation near Farmington can be expected to increase when Navajo is filled and when the irrigation works are completed. Natural gas deposits are found along the river above Farmington and a uranium mill is located a short distance above the surveillance station.

Station Location:	San Juan River at Shiprock, New Mexico
Major Basin:	Colorado River
Minor Basin:	San Juan River
Station at:	36°48' Latitude 108°44' Longitude
Miles above mouth:	208
Activation Date:	August 7, 1961
Sampled by:	San Juan County Health Department
Field Analysis by:	San Juan County Health Department U.S. Public Health Service
Other Cooperating Agencies:	New Mexico Department of Public Health
Hydrologic Data:	
Nearest pertinent gaging station:	At Shiprock, New Mexico
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	12,900 square miles
Period of record:	1927 to present
Average discharge in record period:	2,370 cfs.
Maximum discharge in record period:	80,000 cfs.
Minimum discharge in record period:	8 cfs. (daily)

Remarks: Irrigation diversion above station for about 118,000 acres. Navajo Dam completed in June 1963, about 75 miles upstream.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval	
		10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.60	.50
	Na	95	40
	K	2.1	2.8
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	29	22
	Cd	*7	*4
	As	*50	*40
	B	74	56
	P	*37	50
	Fe	40	66
	Mo	15	*10
	Mn	*1.5	6
	Al	–	200
	Be	*.18	*.1
	Cu	4	18
	Ag	*1.5	1.4
	Ni	*4	*4
	Co	*15	*4
	Pb	*37	14
	Cr	*4	*10
	V	*7	*20
	Ba	63	26
	Sr	1030	338

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.7	.1	April to June	1.9	.3
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

STATE	NEW MEXICO
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION	SAN JUAN RIVER AT SHIPROCK, NEW MEXICO

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RADIOACTIVITY DETERMINATIONS

DATE SAMPLE TAKEN			DATE OF DETERMINATION		RADIOACTIVITY IN WATER: ALPHA SUSPENDED		ALPHA DISSOLVED		ALPHA TOTAL		BETA SUSPENDED		BETA DISSOLVED		BETA TOTAL		RADIOACTIVITY IN PLANKTON: DATE OF DETERMINATION		GROSS ACTIVITY ALPHA		GROSS ACTIVITY BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	11	1	0	1	6	3	6	3	5	11	15	15	20	19						
10	8	62	11	28	0	1	4	5	4	5	4	11	9	17	13	20						
10	15	62	10	24	0	0	10	5	10	5	2	4	25	8	27	9						
10	22	62	11	21	206	149	10	5	216	149	1081	540	56	18	1137	540						
10	29	62	11	23	-	-	-	-	-	-	11	10	24	11	35	18						
11	5	62	11	27	1	1	16	6	17	6	5	13	131	21	136	25						
11	13	62	12	26	1	1	3	3	4	3	11	10	32	16	43	19						
11	19	62	12	13	33	29	11	5	44	29	273	189	78	21	351	190						
11	26	62	12	15	0	1	4	4	4	4	0	37	43	15	43	40						
12	3	62	1	3	1	1	13	5	14	5	5	13	33	19	38	23						
12	10	62	1	10	0	2	9	5	9	5	26	26	149	35	175	44						
12	19	62	1	14	1	1	5	4	6	4	14	6	41	10	55	12						
12	26	62	1	14	0	2	9	6	9	6	36	13	49	17	85	21						
1	2	63	1	15	0	2	12	6	12	6	31	27	30	32	61	42						
1	8	63	1	24	1	2	11	6	12	6	30	26	46	33	76	42						
1	15	63	1	25	0	2	12	8	12	8	41	31	99	42	140	52						
1	23	63	2	11	0	1	6	5	6	5	7	6	47	10	54	12						
2	13	63	3	11	0	2	7	5	7	5	15	12	43	15	58	19						
2	20	63	3	7	3	3	17	7	20	7	61	28	50	30	111	41						
2	27	63	5	15	7	4	13	5	20	6	23	28	34	29	57	31						
3	6	63	3	25	1	2	11	5	12	5	19	8	34	10	53	13						
3	13	63	3	27	4	2	53	10	57	10	37	12	102	19	139	22						
3	20	63	4	1	0	1	20	6	20	6	0	23	41	8	41	24						
3	27	63	4	10	16	8	7	3	23	9	104	23	32	16	136	28						
4	3	63	4	25	4	3	2	2	6	4	73	16	46	14	119	21						
4	17	63	5	1	13	7	6	3	19	8	69	20	47	9	116	22						
4	24	63	5	20	1	2	4	4	5	4	0	27	38	14	38	30						
5	8	63	5	27	47	21	3	2	50	21	207	41	40	4	247	41						
5	15	63	6	5	6	3	3	2	9	4	46	9	29	8	75	12						
5	22	63	6	7	9	3	4	2	13	4	52	10	35	8	87	13						
5	29	63	6	12	1	1	4	2	5	2	36	7	34	9	70	11						
6	5	63	6	24	1	1	5	3	6	3	5	6	21	7	26	9						
6	19	63	7	3	1	1	7	4	8	4	9	11	38	16	47	19						
6	26	63	7	15	0	0	8	5	8	5	2	3	28	9	30	9						
7	3	63	7	15	0	0	23	11	23	11	1	2	45	20	46	20						
7	10	63	7	31	120	75	14	8	134	75	1021	211	104	31	1125	213						
7	17	63	8	7	2	2	8	6	10	6	25	8	24	28	49	29						
7	24	63	8	14	0	0	21	16	21	16	7	6	111	52	118	52						
7	31	63	8	14	1	1	50	17	51	17	4	5	68	42	72	42						

RADIOACTIVITY DETERMINATIONS

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION SAN JUAN RIVER AT

SHIPROCK, NEW MEXICO 93

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER															RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA							DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL					ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±		MO.	DAY	pc/g	±	pc/g	±
8	7	63	3	21	132	80	11	7	143	80	757	260	58	30	815	262							
8	14	63	9	6	54	61	9	6	63	61	638	211	12	27	650	213							
8	21	63	9	16	3	4	7	4	10	6	32	10	19	12	51	16							
8	28	63	9	23	1593	861	6	6	1599	861	7308	999	35	15	7343	999							
9	4	63	9	17	14	14	8	4	22	15	107	77	14	14	121	78							
9	11	63	10	1	6	3	9	5	15	6	15	9	15	9	30	13							
9	18	63	10	4	24	32	17	6	41	33	266	292	51	17	317	292							
9	25	63	10	10	26	39	8	4	34	39	91	308	23	16	114	308							

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW MEXICO
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION SAN JUAN RIVER AT
SHIPROCK, NEW MEXICO 93

DATE OF SAMPLE						EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY	GALLONS FILTERED	TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	5	62	10	15	4077	116	35	81	1	10	11	1	1	9	0	4	2	1	6
11	5	62	11	26	12537	80	20	60	0	5	8	0	0	7	1	3	1	0	3
12	3	62	12	6	1747	182	25	157	1	5	14	3	2	8	1	2	1	1	1
2	6	63	2	13	2624	225	70	155	2	18	23	2	2	19	0	6	8	2	11
3	6	63	3	13	1786	256	41	215	-	-	-	-	-	-	-	-	-	-	-
4	3	63	4	10	5000#	87	25	62	1	6	11	2	1	7	1	2	1	1	3
5	1	63	5	8	4572	139	39	100	-	-	-	-	-	-	-	-	-	-	-
6	5	63	6	12	4536	130	49	81	6	13	9	1	0	7	1	4	4	1	12
7	3	63	7	10	4566	203	72	131	-	-	-	-	-	-	-	-	-	-	-
8	9	63	8	14	3290	224	85	139	1	21	30	1	2	26	1	10	8	2	13

ESTIMATED

PLANKTON POPULATION

STATE NEW MEXICO
MAJOR BASIN COLORADO RIVER
MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION SAN JUAN RIVER AT SHIPROCK, NEW MEXICO 093

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES: ROTIFERS											CRUSTACEA							NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
			1ST		2ND		3RD		4TH					NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes): 1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes): 1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	1	62										-	-	0											0							0	0
10	15	62	64	36	31	17	71	7	92	5	35	20		0											0							0	0
11	5	62	86	33	92	16	64	7	36	5	39	-	-	0											0							0	0
11	19	62										-	-	-											-							-	-
12	3	62	36	57	65	15	92	14	86	4	10	140		1											0							0	0
12	19	62	36	45	65	42	92	4	88	2	7	-	-	0											0							0	0
1	2	63	36	49	65	18	92	12	86	5	16	-	-	0											0							0	0
1	23	63	86	25	65	21	36	18	92	4	32	-	-	0											0							0	0
2	6	63										-	-	-											-							-	-
2	20	63	65	34	86	31	36	6	51	3	26	-	-	0											0							0	0
3	6	63	65	62	36	13	92	11	86	3	11	-	-	0											0							0	0
3	20	63	65	57	86	20	92	8	36	4	11	-	-	0											0							0	0
4	3	63	92	27	36	17	71	10	65	6	40	-	-	-											-							-	-
4	17	63										-	-	-											-							-	-
6	5	63	65	11	31	10	51	9	86	9	61	-	-	-											-							-	-
6	19	63	15	20	92	13	65	11	31	10	46	-	-	-											-							-	-
8	7	63										-	-	-											-							-	-
8	21	63										-	-	-											-							-	-
9	4	63										-	-	-											-							-	-
9	18	63										-	-	-											-							-	-

PLANKTON POPULATION

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION SAN JUAN RIVER AT SHIPROCK, NEW MEXICO 93

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS			
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE
10	1	62	00	0	0	0	0	0	0	10	20	0	30
10	15	62	1000	0	0	30	0	0	0	80	860	50	690
11	5	62	1800	0	0	0	0	0	20	50	1760	50	1400
11	19	62	500	0	0	0	0	0	0	0	500	0	70
12	3	62	1500	0	0	0	0	0	0	20	1510	0	740
12	19	62	900	0	0	0	0	0	0	0	900	0	290
1	2	63	1300	0	0	50	0	0	0	0	1300	0	430
1	23	63	100	0	0	0	0	0	0	0	110	20	120
2	6	63	3100	0	0	0	0	0	0	110	3010	0	1720
2	20	63	1400	0	0	60	0	40	60	60	1130	60	1300
3	6	63	1700	0	0	0	0	0	40	20	1630	20	1390
3	20	63	2200	0	0	80	0	0	190	110	1790	80	2350
4	3	63	3300	0	0	20	0	20	80	40	3150	110	2560
4	17	63	4600	0	20	20	0	40	570	20	3890	60	3890
6	5	63	1600	0	20	110	0	20	20	20	1410	0	710
6	19	63	1300	0	0	50	0	0	0	50	1200	0	720
8	7	63	*	-	-	-	-	-	-	-	-	-	-
8	21	63	1500	0	0	100	0	0	0	20	1330	0	410
9	4	63	*	-	-	-	-	-	-	-	-	-	-
9	18	63	*	-	-	-	-	-	-	-	-	-	-

DATE OF SAMPLE			MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62																				
10	15	62	87	2	81	1																
11	5	62	91	2	92	1	87	1														
11	19	62																				
12	3	62	82	3	87	1	92	1														
12	19	62																				
1	2	63	82	3	87	1	92	1														
1	23	63																				
2	6	63																				
2	20	63	87	2	91	2																
3	6	63	87	3	82	1	92	1														
3	20	63	87	3	91	2																
4	3	63	92	3	82	2	88	2	87	1	91	1	97	1								
4	17	63	65	1																		
6	5	63	87	1	81	1	88	1														
6	19	63	79	1	87	1	92	1														
8	7	63																				
8	21	63																				
9	4	63																				
9	18	63																				

* TOO TURBID TO COUNT

STATE	NEW MEXICO
MAJOR BASIN	COLORADO RIVER
MINOR BASIN	MIDDLE COLORADO-SAN JUAN RIVERS
STATION LOCATION	SAN JUAN RIVER AT SHIPROCK, NEW MEXICO 93

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	17.0	-	7.7	-	-	-	-	.2	52	168	308	2	8	170	-	-	100
10	5	62	12.0	10.2	8.2	4.2	-	-	-	.1	60	296	354	3	16	300	-	780	-
10	9	62	16.0	6.1	8.4	2.6	-	-	-	.4	47	150	326	2	6	216	-	730	3000
10	15	62	12.0	8.9	8.5	1.5	-	-	-	.1	47	144	354	-	-	260	-	730	100
10	22	62	12.0	9.4	8.2	6.8	-	-	-	.1	37	288	270	8	20000	240	-	740	-
10	29	62	12.0	9.5	8.4	3.5	-	-	-	.1	45	298	334	-	990	260	-	760	9000
11	5	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5800
11	13	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800
11	18	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5000
11	26	62	-	-	8.2	-	-	-	-	-	22	142	730	0	*25	290	.0	652	*67
12	3	62	-	-	7.9	-	-	-	-	-	29	148	340	5	*25	330	.0	720	5100
12	10	62	-	-	8.1	-	-	-	-	-	34	150	348	5	*25	340	.0	800	2600
12	19	62	-	-	7.8	-	-	-	-	-	38	148	360	-	*25	330	.0	735	20000
12	26	62	-	-	7.8	-	-	-	-	-	50	188	470	-	*25	390	.0	895	-
1	8	63	-	-	8.0	-	-	-	-	-	43	160	960	-	*25	380	.0	812	-
1	15	63	-	-	7.9	-	-	-	-	-	76	252	580	-	*25	538	.0	1210	-
1	23	63	.0	-	7.9	-	-	-	-	.3	-	-	-	-	-	-	-	-	2500
1	30	63	-	-	7.8	-	-	-	-	-	37	150	380	-	*25	310	.2	750	670
2	8	63	6.0	-	-	-	-	-	-	.1	-	-	-	-	-	-	-	-	10000
2	13	63	4.0	-	8.0	-	-	-	-	1.0	45	156	270	2	144	175	.0	480	2000
2	20	63	6.0	5.3	8.1	2.0	-	-	-	.2	39	168	368	-	180	360	-	-	1100
2	27	63	8.0	5.5	8.1	.8	-	1.6	3.7	.1	-	-	-	-	-	-	-	-	100
3	13	63	8.0	-	8.0	-	-	.9	1.9	.1	38	140	320	0	*25	290	.0	660	2000
3	20	63	7.0	5.3	8.0	.7	-	.9	2.0	.1	27	144	330	0	*25	280	.0	640	870
3	27	63	-	-	7.1	-	-	-	-	-	13	136	290	5	390	194	.0	500	11000
4	3	63	8.0	5.8	7.9	2.0	-	1.0	2.4	.1	8	104	210	5	220	125	.0	350	3800
4	17	63	-	-	7.3	2.5	47	1.2	-	-	10	104	180	5	280	115	.0	310	53000
4	24	63	-	7.8	7.4	1.4	34	.9	1.8	.3	34	148	360	0	*25	320	.0	710	600
5	8	63	-	-	-	-	-	-	-	-	12	100	210	0	480	80	.0	280	33000
5	15	63	-	-	-	-	-	-	-	-	9	88	190	5	*25	120	.0	270	25000
5	22	63	15.0	-	7.7	-	19	1.6	5.2	.1	16	80	160	1	1	90	2.2	270	37000
5	29	63	20.0	-	8.3	-	31	2.0	7.8	.0	9	86	200	5	*25	140	.0	350	40000
6	5	63	14.5	8.6	8.2	3.4	23	1.9	3.8	.0	12	100	240	10	*25	175	.0	430	-
6	12	63	16.0	8.3	8.3	1.8	19	.6	.9	.3	-	-	-	-	-	-	-	-	1500

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW MEXICO

MAJOR BASIN COLORADO RIVER

MINOR BASIN MIDDLE COLORADO-SAN JUAN RIVERS

STATION LOCATION SAN JUAN RIVER AT SHIPROCK, NEW MEXICO 93

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
6	19	63	18.5	8.1	7.9	1.4	22	.8	4.8	.1	23	114	270	5	*25	230	.0	500	1300
6	26	63	18.0	7.8	7.8	1.8	18	.2	5.8	.2	25	134	320	5	*25	310	.0	680	1100
7	3	63	19.0	8.7	7.7	1.5	20	.6	2.4	.1	73	130	560	5	*25	760	.0	1440	-
7	10	63	22.0	6.1	7.7	4.6	31	.6	4.9	.9	45	162	510	15	*25	440	.0	1100	-
7	17	63	21.0	7.7	7.9	1.7	31	1.0	3.6	.1	32	146	410	10	*25	480	.0	850	-
7	24	63	22.0	9.1	8.1	1.5	27	.4	1.9	1.6	99	132	750	5	*25	1100	.0	1920	400
7	31	63	23.0	9.0	8.2	6.0	37	1.2	4.7	1.4	94	132	710	15	*25	1000	.0	1810	100
8	7	63	21.0	5.9	8.0	2.5	34	1.3	3.2	-	40	180	460	15	5000	520	.0	1230	25000
8	14	63	-	3.8	8.0	2.3	-	-	-	.3	-	-	-	-	-	-	-	-	30000
8	21	63	21.0	8.2	7.9	-	-	-	-	-	58	166	600	5	270	550	.0	1110	-
8	28	63	20.0	-	7.6	-	-	-	-	.2	55	230	160	5	50000	750	.0	1900	-
9	4	63	18.0	7.6	7.7	2.7	-	-	-	.2	16	120	360	0	1500	220	.0	-	10000
9	11	63	22.0	-	7.9	-	25	.4	3.3	.5	28	130	400	0	500	340	.0	720	-
9	18	63	-	7.8	8.0	4.9	-	-	-	.7	32	148	400	10	1200	370	.0	800	300
9	25	63	17.0	7.2	7.9	3.3	-	-	-	.2	36	136	320	5	1300	290	.0	600	400

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Shiprock, New Mexico
Operated by U.S. Geological Survey

STATE New Mexico

MAJOR BASIN Colorado River

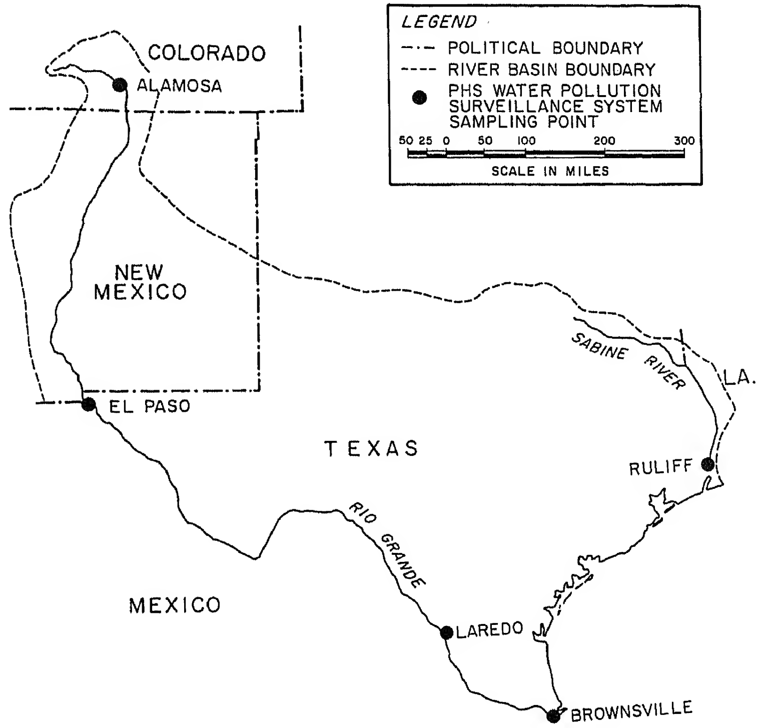
MINOR BASIN Middle Colorado-San Juan Rivers

STATION LOCATION San Juan River at Shiprock, New Mexico

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.719	.614	.621	.456	.550	.420	1.210	.240	1.440	.155	.062	1.590
2	.628	.628	.649	.504	.560	.380	1.230	.224	1.360	.100	.062	1.240
3	.582	.607	.635	.540	.600	.492	1.130	.164	1.300	.083	.074	1.050
4	.534	.594	.594	.552	.550	.498	.998	.171	1.040	.070	.390	.828
5	.504	.594	.534	.498	.546	.498	.900	.441	.812	.051	.666	.705
6	.510	.558	.498	.450	.582	.510	.852	1.130	.812	.058	.830	.698
7	.510	.570	.492	.438	.588	.486	.780	1.620	.806	.054	.600	.692
8	.504	.552	.492	.420	.552	.498	.812	2.260	.740	.064	.510	.782
9	.444	.546	.492	.400	.540	.486	.852	2.820	.866	.151	.468	.645
10	.420	.582	.492	.410	.552	.492	.924	2.920	.872	.361	.830	.500
11	.385	.570	.480	.395	.600	.486	.908	2.180	.680	.588	.677	.435
12	.375	.540	.492	.162	.546	.504	.836	2.100	.500	.546	.534	.391
13	.375	.534	.444	.100	.480	.540	1.060	1.750	.435	.486	.500	.411
14	.365	.546	.450	.120	.468	.522	1.820	1.770	.616	.486	.391	.415
15	.360	.635	.462	.150	.468	.480	2.100	1.820	.719	.462	.319	.464
16	.365	.794	.468	.200	.504	.504	2.420	1.470	.980	.364	.284	.480
17	.796	.812	.462	.300	.522	.516	2.250	1.720	.852	.261	.237	.474
18	2.880	.782	.468	.400	.498	.498	1.910	2.400	.663	.180	.240	.456
19	6.190	.752	.498	.500	.498	.498	1.770	2.920	.582	.109	.239	.400
20	4.020	.719	.498	.470	.498	.480	1.390	2.680	.540	.087	.206	1.290
21	1.360	.684	.468	.420	.486	.498	.635	2.480	.504	.068	.206	2.580
22	1.020	.677	.450	.400	.516	.558	.478	2.260	.558	.066	.244	1.190
23	.796	.670	.420	.390	.486	.635	.347	2.040	.582	.066	.340	.852
24	.756	.649	.415	.380	.486	.698	.252	1.810	.504	.062	.426	.719
25	.733	.635	.415	.400	.486	.804	.226	1.510	.395	.060	.444	.642
26	.719	.614	.390	.450	.456	.884	.404	1.360	.312	.098	.410	.621
27	.684	.614	.335	.430	.456	.956	.496	1.220	.264	.171	1.220	.582
28	.663	.614	.316	.420	.456	1.130	.496	1.330	.216	.193	1.420	.516
29	.663	.600	.330	.420		1.280	.435	1.330	.166	.100	1.260	.474
30	.628	.600	.370	.440		1.310	.340	1.430	.171	.070	1.080	.420
31	.628		.400	.470		1.220		1.380		.064	1.510	

BASIN 12

WESTERN GULF



The Western Gulf Drainage Basin includes most of Texas and New Mexico and small portions of Colorado and Louisiana. Topography varies from the sea level coastal plain to the 14,000-foot peaks of southern Colorado. Average annual rainfall ranges from 8 inches in the plains of New Mexico to 52 inches in the southeastern portion. Mean temperatures vary from 40° F. near the mountainous headwaters to 70° F. along the Gulf of Mexico.

Two river systems within the Western Gulf Basin, the Sabine on the east and the Rio Grande on the west, are included within the PHS Water Pollution Surveillance System.

Sabine River: The Sabine River begins at an elevation of 500 feet in east Texas, flows to the southeast for about 200 miles, and then turns south to form the Texas-Louisiana border for 180 miles. The river discharges into Sabine Lake near Port Arthur and thence into the Gulf of Mexico. The total drainage area is about 9,700 square miles.

Rio Grande: The Rio Grande drains an area of 182,200 square miles of which about half are in Mexico. The headwaters are on the eastern flank of the San Juan Mountains in south central Colorado. The river then flows southward through New Mexico and thence southeasterly to form the border between Mexico and the United States.

The Rio Grande drains the San Luis Valley of Colorado. This is an area of extensive agricultural development and the flow is affected by irrigation withdrawals and returns and by the operation of storage reservoirs. Upon entering New Mexico, the Rio Grande traverses an area which is arid. There are two large main stem impoundments above the El Paso Surveillance System station. These are Elephant Butte and Cabello Reservoirs which store most of the flow from September to March and for subsequent release during the growing season. Below El Paso, the river drains a portion of Mexico that contributes little surface runoff. In the vicinity of Brownsville, the stream supports an area of extensive irrigated agriculture.

Maximum phytoplankton counts at stations in this basin range from 10,000 to 30,000/milliliter. Except for summer pulses of blue-green and green algae, at Brownsville, Tex., on the Rio Grande River, the phytoplankton is dominated by diatoms. The lower reach of the Rio Grande supports a rich and diverse algal flora. The Brownsville station is

unique in having reoccuring high counts of the planktonic filamentous green alga, *Binuclearia,* which persist through late summer and early fall. Reoccurring populations of planktonic filamentous green algae have not been observed at any other network station.

The abundant pennate diatoms of this basin are *Synedra acus, S. ulna, Diploneis smithii,* and *Caloneis amphisbaena.* The abundant centric diatoms are *Stephanodiscus astraea* var. *minutula,* and *Cyclotella meneghiniana.*

Populations of the rotifers, *Keratella, Brachionus, Trichocerca,* and *Synchaeta,* together approach 3,000/liter during late summer in the Rio Grande River.

RIO GRANDE AT BROWNSVILLE, TEXAS

The Brownsville station is the terminal station on the Rio Grande. Samples are collected at the intake of Brownsville No. 1 Water Plant. Falcon Reservoir, on the main stem between Brownsville and Laredo, provides irrigation and municipal water supplies for the communities which compose the "Magic Valley" at the southern end of Texas. This agricultural district supports a diversified production of cotton, vegetables, corn, grains and citrus fruit. Most of the industrial wastes result from canning and packing operations. Municipal and industrial wastes in this valley for the most part are diverted into the Gulf of Mexico via arroyos and floodways. Brownsville is an exception and this city discharges 9,300 BOD population equivalents into the Rio Grande from its treatment plant. There are no communities downstream.

The chlorinated pesticides, DDT and dieldrin, have been identified in carbon adsorption method samples from this station.

Station Location:	Rio Grande at Brownsville, Texas
Major Basin:	Western Gulf
Minor Basin:	Rio Grande/Lower/Below Pecos River
Station at:	25°55' Latitude 97°30' Longitude
Miles above mouth:	52
Activation Date:	October 19, 1959
Sampled by:	Brownsville Water Department
Field Analysis by:	Brownsville Water Department U.S. Public Health Service
Other Cooperating Agencies:	Texas State Department of Health
Hydrologic Data:	
Nearest pertinent gaging station:	Rio Grande at Lower Brownsville Gaging Station
Gaging station operated by:	International Boundary & Water Commission
Drainage area at gaging station:	182,200 square miles
Period of record:	1934 to present
Average discharge in record period:	2,580 cfs.
Maximum discharge in record period:	–
Minimum discharge in record period:	–
Remarks:	

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
2-25-63	0.04
3-4-63	0.06
3-11-63	0.05
3-25-63	0.04
4-1-63	0.03
4-15-63	0.03
4-22-63	0.02
5-27-63	0.04

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.76	.85
	Na	162	155
	K	6.3	7.6
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	*15	*6
	Cd	*8	*8
	As	*50	*50
	B	375	246
	P	*19	*39
	Fe	24	*16
	Mo	*8	*8
	Mn	*3.8	*7.8
	Al	–	*39
	Be	*.19	*.20
	Cu	*8	*8
	Ag	*1.5	*2.0
	Ni	*8	*8
	Co	*15	*8
	Pb	*19	*20
	Cr	*4	*4
	V	*8	*8
	Ba	124	101
	Sr	1160	858

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.3	.2	April to June	–	–
January to March	–	–	July to September	2.3	.3

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
11/19 - 12/4/62	DDT	
1/7 - 1/18/63	DDT	
6/22 - 7/1/63	Dieldrin	0.001
6/22 - 7/1/63	DDT	0.144

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT BROWNSVILLE, TEXAS 71

DATE SAMPLE TAKEN			DATE OF DETERMI-NATION		RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
					ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	12	24	-	-	-	-	-	-	1	19	32	26	33	32						
10	9	62	11	30	-	-	-	-	-	-	18	11	30	14	48	18						
10	15	62	12	3	-	-	-	-	-	-	10	6	26	9	36	11						
10	22	62	12	5	-	-	-	-	-	-	56	24	52	29	108	38						
10	29	62	11	26	0	1	2	4	2	4	14	11	40	15	54	19						
11	26	62	12	28*	1	2	5	5	6	5	6	28	16	37	22	46						
12	31	62	1	23*	C	2	11	7	11	7	5	25	56	33	61	41						
1	28	63	3	1*	1	3	5	7	6	8	9	28	17	37	26	46						
2	25	63	3	20*	0	0	4	4	4	4	14	7	22	10	36	12						
3	25	63	4	17*	0	1	1	5	1	5	5	6	15	38	20	39						
4	29	63	5	24*	1	2	0	3	1	4	5	14	25	28	30	31						
5	27	63	6	19*	0	2	3	4	3	4	17	21	31	29	48	36						
6	16	63	7	31*	4	3	2	4	6	5	36	10	42	28	78	30						
7	29	63	8	21*	C	0	1	5	1	5	14	6	17	38	31	38						
8	26	63	10	1*	0	1	0	2	0	2	3	3	29	18	32	18						
9	30	63	10	31*	0	1	3	6	3	6	7	12	21	31	28	33						

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PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

BROWNSVILLE, TEXAS 071

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES: ROTIFERS											CRUSTACEA							NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
			1ST		2ND		3RD		4TH					NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes): 1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes): 1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	1	62	89	87	38	4	26	3	4	2	4	0	0	518	11	7	9	4	22	3	17	2	2	1	0							0	0
10	15	62	92	82	75	7	38	4	65	1	6	0	0	3060	17	9	22	8	21	3	18	3	2	2	0							0	0
11	5	62	89	79	92	5	47	4	38	4	8	0	0	0											0							0	0
11	19	62	89	72	91	6	38	6	70	6	10	1490	0	0											0							0	0
12	3	62	89	29	78	10	91	5	12	5	51	50	0	72	22	3	11	3	17	2					0							0	0
12	10	62	89	59	38	7	78	4	92	3	27	410	0	53	11	3	17	2							0							0	0
1	7	63	89	21	38	19	71	9	70	6	45	0	0	101	21	5									1							0	0
1	14	63	89	20	80	14	71	11	79	5	50	0	0	1											0							0	1
2	4	63	38	32	80	25	82	21	92	4	18	0	0	0											0							0	0
2	18	63	80	29	82	14	38	11	92	8	38	0	0	0											0							0	0
3	4	63	80	61	92	6	38	6	89	4	23	0	0	2380	21	9	17	5	11	3	15	1			6	50	2					1	0
3	18	63	38	31	5	15	82	8	70	7	39	–	0	0											0							0	0
4	1	63	80	40	6	12	38	6	92	5	37	–	–	–											–							–	–
4	15	63	38	22	56	21	26	5	71	5	47	–	–	268	21	5	17	5	11	4					2							0	0
5	6	63	80	21	38	12	70	8	56	6	53	–	–	–											–							–	–
5	20	63	91	60	70	13	38	7	71	6	14	–	–	–											–							–	–
6	10	63										–	–	–											–							–	–
7	1	63										–	–	–											–							–	–
7	15	63	92	75	91	8	70	4			13	–	–	–											–							–	–
7	22	63	71	33	89	30	68	4	26	4	29	–	–	–											–							–	–
8	5	63	89	91	71	3					6	–	–	–											–							–	–
8	20	63	89	48	70	12	91	9	38	7	24	–	–	–											–							–	–
9	3	63	89	83	91	8	71	3	68	1	5	–	–	–											–							–	–
9	16	63	89	79	38	4	70	4	91	3	10	–	–	–											–							–	–
9	30	63	89	62	91	14	70	4	98	2	18	–	–	–											–							–	–

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

BROWNSVILLE, TEXAS 71

DATE OF SAMPLE			ALGAE (Number per milliliter)								INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	8500	2070	790	2360	170	370	0	560	2150	40	310	92	4	3	3	1	3	25	3	30	3	16	3	68	2	51	2	4	1	38	1
10	15	62	8400	1040	250	1700	0	290	0	540	4600	170	540	92	5	3	3	45	2	1	2	25	2	38	2	71	2	89	2	16	1	28	1
11	5	62	4400	430	50	180	0	20	20	90	3620	70	360	92	5	1	1																
11	19	62	15300	1470	0	2150	80	210	0	730	10680	80	500	92	6	25	4	88	3	1	3	83	3	3	3	38	1	40	1	44	1		
12	3	62	13600	360	0	450	0	50	0	90	12690	90	860	92	6	88	4	97	4	87	3	78	3	89	2	91	2	83	2	75	2	86	2
12	10	62	28700	1410	0	3440	80	120	80	330	23180	60	2280	92	7	83	4	87	4	88	4	25	3	38	3	97	3	3	3	1	2	44	2
1	7	63	2700	0	20	510	0	150	0	110	1940	70	460	88	2	92	2	83	2	38	1	87	1	44	1								
1	14	63	2800	40	0	310	0	0	20	370	2020	290	990	92	3	88	2	71	2	97	1	87	1										
2	4	63	800	0	0	160	0	90	0	180	350	0	330	83	1																		
2	18	63	2700	0	0	180	0	130	1610	350	480	180	350	64	4	71	2	65	1	92	1	83	1										
3	4	63	2800	0	270	480	0	40	360	500	1090	330	420	71	2	65	2	88	2	92	2	38	1	83	1								
3	18	63	3700	70	150	350	0	40	0	260	2860	0	130	83	3	88	2	74	2	87	1	92	1										
4	1	63	7000	40	20	920	0	90	0	420	5540	90	1140	75	4	88	3	83	3	92	2	71	2	87	2	78	2	38	1	30	1	86	1
4	15	63	5100	20	20	1300	0	70	0	330	3320	220	860	83	3	88	3	38	2	68	2	87	1	26	1	74	1	91	1	86	1		
5	6	63	1700	0	0	350	0	70	0	150	1120	40	150	82	2	83	1																
5	20	63	16900	860	180	1190	0	330	0	420	13900	220	590	92	6	88	5	83	3	3	3	26	2	87	2	68	2	52	1				
6	10	63	3100	0	20	920	0	20	40	1070	1050	250	250	69	3	38	2	35	1														
7	1	63	4200	60	20	1350	700	1140	0	310	600	230	60	50	3	57	2	51	2	38	2	25	2										
7	15	63	4400	80	0	190	*	20	0	120	970	100	230	50	5	92	3	50	1														
7	22	63	2800	290	150	170	770	60	0	40	1370	20	150	50	3	88	3	92	2	3	1												
8	5	63	10500	1260	420	1600	940	50	0	370	5830	570	3490	92	6	50	3	3	3	17	2	1	2	88	2	38	1	35	1	44	1	69	1
8	20	63	4300	620	350	600	*	60	0	100	1410	20	120	50	3	92	3	1	2	17	2	88	1	38	1	35	1						
9	3	63	8800	1080	110	1060	470	20	0	430	5590	150	430	92	6	1	2	50	2	3	2	88	2	68	1	45	1	38	1	35	1	5	1
9	16	63	18100	7020	3550	1460	230	90	0	90	5670	90	430	92	5	38	2	88	2	1	2	44	2	83	1	50	1	35	1	87	1	30	1
9	30	63	14400	5870	2860	1800	110	140	20	140	3470	50	590	9	6	92	5	18	5	30	3	1	2	38	2	15	2	88	2	3	2	25	1
7	15	63				*	2980																									
8	20	63				*	1120																									

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER

(Parts per billion)

STATE	TEXAS
MAJOR BASIN	WESTERN GULF
MINOR BASIN	RIO GRANDE /LOWER/ BELOW PECOS RIVER
STATION LOCATION	RIO GRANDE AT BROWNSVILLE, TEXAS 71

DATE OF SAMPLE: BEGINNING			END			EXTRACTABLES			CHLOROFORM EXTRACTABLES		NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY	GALLONS FILTERED	TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	22	62	11	1	2860	194	31	163	0	8	14	1	1	12	0	4	1	1	3
11	19	62	12	4	5805	148	13	135	1	2	7	0	1	5	1	1	1	0	1
1	7	63	1	18	5443#	–	16	*	1	4	5	1	0	4	0	2	1	1	2
2	18	63	2	22	1440	303	47	256	–	–	–	–	–	–	–	–	–	–	–
3	26	63	4	1	3279	195	23	172	1	5	11	2	1	8	0	2	1	1	2
4	28	63	5	4	3537	176	28	148	–	–	–	–	–	–	–	–	–	–	–
6	22	63	7	1	5472	98	25	73	1	7	9	1	1	7	0	3	1	1	3
7	25	63	8	1	4588#	163	30	133	–	–	–	–	–	–	–	–	–	–	–
8	26	63	9	1	3920	153	43	110	2	14	10	1	1	8	0	5	4	1	7

ESTIMATED   * LABORATORY ACCIDENT

STATE	TEXAS
MAJOR BASIN	WESTERN GULF
MINOR BASIN	RIO GRANDE /LOWER/ BELOW PECOS RIVER
STATION LOCATION	RIO GRANDE AT
	BROWNSVILLE, TEXAS 71

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	-	7.8	8.2	1.0	-	-	-	-	290	135	350	5	30	225	.0	925	16000
10	9	62	-	7.5	7.8	.9	-	-	-	-	70	96	160	5	*25	105	.0	405	180
10	15	62	-	7.3	8.3	.8	-	-	-	-	150	116	210	5	60	150	.0	548	2400
10	22	62	28.0	7.2	8.3	1.2	-	-	-	-	157	112	252	5	*25	205	.0	685	300
10	29	62	-	-	8.0	-	-	-	-	-	165	140	320	0	*25	235	.0	849	400
11	5	62	20.9	7.2	7.9	.8	-	-	-	-	328	128	360	0	*25	270	.0	1176	-
11	12	62	23.7	8.6	8.1	1.6	-	-	-	-	220	140	320	0	*25	260	.0	905	2900
11	19	62	17.5	8.9	8.0	1.3	-	-	-	-	227	140	356	0	*25	280	.1	1000	100
11	26	62	22.2	8.6	8.2	2.2	-	-	-	-	240	132	356	0	*25	290	.0	1125	270
12	3	62	19.5	8.9	8.3	1.6	-	-	-	-	224	162	360	0	*25	265	.0	990	-
12	10	62	20.6	8.9	8.1	2.0	-	-	-	-	311	122	360	0	*25	110	.0	975	-
12	17	62	20.6	9.2	8.2	2.2	-	-	-	-	224	144	340	0	*25	265	.0	950	200
12	31	62	-	-	8.0	-	-	-	-	-	146	136	340	-	*25	230	.0	764	-
1	7	63	15.0	9.0	8.1	1.0	-	-	-	-	77	120	268	-	*25	-	.0	720	700
1	14	63	15.0	8.9	8.1	1.4	-	-	-	-	216	132	332	-	*25	260	.0	935	100
1	21	63	12.0	8.6	8.0	1.6	-	-	-	-	140	128	308	-	*25	240	.0	835	1000
1	28	63	10.0	8.6	8.1	2.1	-	-	-	-	160	130	290	-	*25	240	.0	780	*10
2	4	63	16.0	9.8	8.1	2.3	-	-	-	-	110	130	270	-	*25	200	.0	645	1100
2	11	63	-	-	7.9	-	-	-	-	-	132	128	268	0	*25	220	.0	685	500
2	18	63	-	-	7.9	-	-	-	-	-	118	132	264	0	*25	205	.0	650	500
2	25	63	-	-	8.0	-	-	-	-	-	152	132	284	0	*25	225	.0	724	100
3	4	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*13
3	11	63	-	-	8.1	-	-	-	-	-	127	170	290	5	*25	310	.0	1100	*10
3	18	63	-	-	7.4	-	-	-	-	-	220	128	330	0	*25	260	.0	930	100
3	25	63	-	-	7.3	-	-	-	-	-	220	140	260	5	*26	260	.0	920	-
4	1	63	-	-	7.4	-	-	-	-	-	158	120	290	0	*50	230	.0	740	9000
4	8	63	-	-	3.2	-	-	-	-	-	140	124	280	0	150	230	.0	710	500
4	15	63	-	-	7.3	-	-	-	-	-	195	124	290	0	*25	250	.0	740	1500
4	22	63	-	-	7.4	-	-	-	-	-	145	116	270	0	*25	210	.0	680	-
4	29	63	-	-	-	-	-	-	-	-	140	144	310	5	*25	230	.0	740	1600
5	6	63	-	-	-	-	-	-	-	-	160	124	280	0	*25	220	.0	740	-
5	13	63	-	-	-	-	-	-	-	-	320	104	300	0	*25	240	.0	970	-
5	20	63	-	-	-	-	-	-	-	-	160	156	320	0	*25	210	.0	780	-
5	27	63	-	-	-	-	-	-	-	-	165	172	400	5	*25	240	.0	940	650
6	10	63	-	-	-	-	-	-	-	-	150	124	280	5	*25	220	.0	720	-
6	24	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	610
7	1	63	-	-	-	-	-	-	-	-	125	130	250	5	*25	124	.0	550	240
7	8	63	-	-	-	-	-	-	-	-	270	108	370	0	*25	260	.0	970	400

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT
BROWNSVILLE, TEXAS 71

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
7	15	63	-	-	-	-	-	-	-	-	300	146	410	5	*25	350	•0	1130	100
7	22	63	-	-	-	-	-	-	-	-	460	124	420	0	*25	350	•0	1420	1800
7	29	63	-	-	-	-	-	-	-	-	290	146	420	5	*25	290	•0	990	1000
8	5	63	-	-	-	-	-	-	-	-	350	142	470	5	*25	370	•0	1380	950
8	12	63	-	-	-	-	-	-	-	-	180	110	290	0	*25	240	•0	760	70
8	19	63	-	-	-	-	-	-	-	-	170	110	270	5	*25	240	•0	740	800
8	26	63	-	-	-	-	-	-	-	-	180	144	330	0	*25	240	•0	50	*13
9	3	63	-	-	-	-	-	-	-	-	220	110	360	0	*25	260	•0	850	500
9	9	63	-	-	-	-	-	-	-	-	180	110	350	0	*25	250	•0	780	500
9	16	63	-	-	-	-	-	-	-	-	270	152	290	0	*25	280	•0	1010	500
9	23	63	-	-	-	-	-	-	-	-	320	124	400	5	*25	280	•0	990	50
9	30	63	-	-	-	-	-	-	-	-	280	128	340	5	*25	260	•0	930	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Computed Data for Brownsville, Texas
Supplied by International Boundary and Water Commission

STATE Texas

MAJOR BASIN Western Gulf

MINOR BASIN Rio Grande, Lower below Pecos River

STATION LOCATION Rio Grande at Brownsville, Texas

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.118	.151	.123	.223	.086	.074	.496	.209	.640	.188	.154	.112
2	.212	.200	.185	.067	.189	.135	.278	.103	.702	.337	.058	.181
3	.317	.202	.189	.069	.188	.132	.229	.090	.585	.368	.071	.149
4	.189	.164	.153	.121	.146	.112	.183	.243	.371	.393	.194	.125
5	.171	.170	.128	.191	.153	.089	.180	.240	.312	.639	.162	.076
6	.134	.204	.115	.290	.106	.106	.183	.322	.149	.472	.171	.136
7	.124	.178	.110	.290	.135	.049	.098	.576	.132	.299	.167	.154
8	.189	.162	.103	.307	.090	.051	.378	.457	.357	.264	.194	.134
9	.189	.133	.326	.290	.108	.064	.301	.389	.332	.243	.169	.113
10	.162	.141	.560	.262	.106	.127	.232	.438	.388	.198	.183	.114
11	.132	.128	.473	.409	.126	.126	.104	.384	.373	.245	.124	.117
12	.190	.143	.275	.712	.151	.097	.035	.441	.147	.169	.161	.124
13	.186	.140	.178	.612	.161	.114	.035	.328	.191	.132	.129	.107
14	.131	.128	.147	.331	.130	.086	.038	.263	.397	.124	.097	.107
15	.128	.111	.136	.291	.149	.073	.201	.220	.474	.121	.145	.139
16	.114	.104	.161	.168	.229	.169	.212	.182	.370	.114	.283	.160
17	.104	.125	.146	.248	.189	.138	.099	.160	.426	.108	.209	.170
18	.118	.133	.106	.346	.143	.114	.197	.150	.945	.229	.168	.146
19	.239	.172	.169	.224	.104	.137	.221	.148	1.270	.359	.160	.115
20	.336	.134	.071	.177	.111	.127	.130	.153	2.190	.248	.179	.083
21	.215	.114	.083	.485	.063	.099	.113	.146	2.460	.177	.119	.103
22	.147	.111	.170	.554	.050	.079	.133	.127	.878	.305	.071	.260
23	.135	.123	.140	.251	.076	.062	.176	.115	.209	.495	.074	.289
24	.248	.149	.244	.159	.429	.049	.133	.106	.172	.281	.108	.245
25	.269	.149	.741	.177	.441	.054	.120	.097	.456	.145	.114	.193
26	.206	.127	.801	.178	.216	.063	.121	.087	.824	.096	.084	.149
27	.160	.155	.611	.152	.127	.064	.096	.076	.670	.055	.073	.121
28	.164	.165	.287	.202	.075	.250	.057	.079	.623	.069	.084	.139
29	.264	.120	.208	.286		.293	.239	.105	.395	.205	.076	.150
30	.238	.101	.145	.201		.170	.227	.125	.218	.224	.059	.127
31	.187		.228	.153		.170		.333		.188	.060	

Computed as being sum of (1) Flow at Lower Brownsville Station, (2) City of Matamoros Diversion and (3) average daily Diversion at El Jardin Pump.

RIO GRANDE AT LAREDO, TEXAS

This station is 892 river miles below the El Paso Surveillance System station. In this reach, the Pecos River which has a drainage area of about 35,000 square miles has joined the Rio Grande. Samples are collected from the intake of the municipal water plant. The Rio Grande flows through sparsely populated areas in the El Paso to Laredo reach.

Limited use is made of the Rio Grande between Laredo and Eagle Rock for irrigation. DDT, DDD and dieldrin have been identified in carbon adsorption method samples from this station.

Very low plankton populations were observed at this station during October and mid-November 1962 and increased in the latter portion of November. A decrease of turbidity of the water from October through November accompanied this growth.

Station Location: Rio Grande at Laredo, Texas

Major Basin: Western Gulf

Minor Basin: Rio Grande/Lower/Below Pecos River

Station at: 27°31' Latitude 99°31' Longitude

Miles above mouth: 356

Activation Date: November 10, 1957

Sampled by: Laredo Water Department

Field Analysis by: Laredo Water Department

Other Cooperating Agencies: Texas State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: At Laredo, Texas

Gaging station operated by: International Boundary and Water Commission

Drainage area at gaging station: 136,000 square miles

Period of record: 1924 to present

Average discharge in record period: 4,010 cfs.

Maximum discharge in record period: –

Minimum discharge in record period: –

Remarks:

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
1-22-63	0.08
2-26-63	0.10
3-12-63	0.05
3-19-63	0.05
3-26-63	0.05
4-2-63	0.02
4-16-63	0.04
5-21-63	0.04

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	1.08	.80
	Na	190	95
	K	7.5	6.2
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	78	*13
	Cd	*8	10
	As	*50	*50
	B	163	134
	P	*41	64
	Fe	86	13
	Mo	11	*6
	Mn	*1.6	*6.4
	Al	–	*32
	Be	*.2	*.16
	Cu	4	*6
	Ag	*1.6	*1.6
	Ni	*4	*6
	Co	*16	*6
	Pb	*41	*16
	Cr	*4	*3
	V	*8	*8
	Ba	131	90
	Sr	1200	768

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.8	.5	April to June	3.7	.4
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
6/22 - 6/28/63	Dieldrin	0.004
6/22 - 6/28/63	DDT	0.006
6/22 - 6/28/63	DDD	0.004

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

LAREDO, TEXAS 45

DATE SAMPLE TAKEN			DATE OF DETERMINATION		RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
					ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	2	62	12	13	-	-	-	-	-	-	86	86	18	19	104	88						
10	9	62	12	14	-	-	-	-	-	-	31	53	18	18	49	56						
10	16	62	11	7	18	17	9	4	27	17	112	53	12	16	124	55						
10	30	62	11	23	-	-	-	-	-	-	206	77	25	14	231	78						
11	13	62	12	3	-	-	-	-	-	-	5	15	33	21	38	26						
11	20	62	12	18	0	1	5	4	5	4	181	14	16	16	197	21						
11	27	62	12	18	-	-	-	-	-	-	214	140	70	32	284	144						
12	4	62	2	5	0	3	10	7	10	8	10	29	51	37	61	47						
12	11	62	1	4	-	-	-	-	-	-	25	28	56	40	81	49						
12	18	62	1	9	0	3	3	5	3	6	22	33	33	40	55	52						
12	31	62	1	11	0	1	3	4	3	4	21	22	30	26	51	34						
1	8	63	1	24	0	2	8	6	8	6	13	26	27	32	40	41						
1	14	63	1	25	2	3	3	5	5	6	12	26	24	31	36	40						
1	22	63	2	5	-	-	-	-	-	-	8	24	26	30	34	38						
1	29	63	2	11	-	-	-	-	-	-	0	17	27	16	27	23						
2	5	63	2	25	0	2	1	4	1	4	25	15	57	19	82	24						
2	12	63	3	4	-	-	-	-	-	-	22	7	33	10	55	12						
2	19	63	3	4	-	-	-	-	-	-	62	14	41	16	103	21						
2	26	63	3	15	-	-	-	-	-	-	34	22	68	26	102	34						
3	5	63	3	25	1	2	4	4	5	4	9	14	37	17	46	22						
3	12	63	4	1	-	-	-	-	-	-	15	12	43	15	58	19						
3	19	63	4	5	-	-	-	-	-	-	10	11	44	26	54	28						
3	26	63	4	10	-	-	-	-	-	-	0	27	36	32	36	42						
4	2	63	4	18	0	2	2	5	2	5	9	22	8	30	17	37						
4	9	63	4	29	-	-	-	-	-	-	120	16	133	17	253	23						
4	16	63	5	1	-	-	-	-	-	-	3	22	13	30	16	37						
4	23	63	5	20	-	-	-	-	-	-	3	11	40	15	43	19						
4	30	63	5	17	-	-	-	-	-	-	84	30	52	29	136	42						
5	7	63	5	24	24	25	2	2	26	25	577	168	83	17	660	168						
5	14	63	5	31	5	5	0	4	5	6	106	12	53	11	159	16						
5	21	63	6	5	-	-	-	-	-	-	85	19	70	17	155	25						
5	28	63	6	12	-	-	-	-	-	-	360	33	91	17	451	37						
6	4	63	6	17	36	21	0	5	36	22	310	44	74	14	384	46						
6	11	63	7	12	62	52	5	3	67	52	1500	80	67	9	1567	80						
6	18	63	7	24	10	16	0	1	10	16	246	93	37	9	283	93						
6	25	63	7	10	-	-	-	-	-	-	466	96	65	17	531	97						
7	2	63	7	23	19	15	4	4	23	16	297	69	62	15	359	71						
7	9	63	7	31	2	2	3	2	5	3	61	16	54	16	115	23						
7	16	63	8	14	-	-	-	-	-	-	3015	587	70	18	3085	587						

RADIOACTIVITY DETERMINATIONS

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

LAREDO, TEXAS 45

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER																RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
7	23	63	8	12	-	-	-	-	-	-	362	54	46	9	408	55						
7	30	63	8	14	-	-	-	-	-	-	50	18	46	17	96	25						
8	6	63	8	21	12	7	6	4	18	8	78	22	24	17	102	28						
8	13	63	8	27	-	-	-	-	-	-	795	224	42	17	837	225						
8	20	63	9	16	-	-	-	-	-	-	1085	217	40	8	1125	217						
8	27	63	9	17	-	-	-	-	-	-	694	429	43	18	737	429						
9	3	63	9	17	17	12	5	4	22	13	142	74	33	17	175	76						
9	10	63	10	2	78	67	6	4	84	67	968	411	47	18	1015	411						
9	17	63	10	4	-	-	-	-	-	-	795	407	64	17	859	407						
9	24	63	10	14	93	88	2	3	95	88	872	219	36	8	908	219						

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER

(Parts per billion)

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

LAREDO, TEXAS 45

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES										
BEGINNING			END								NEUTRALS								
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	1	62	10	8	1658	118	26	92	1	6	14	5	1	8	0	2	1	1	1
10	26	62	11	14	2928	120	13	107	0	2	7	1	1	5	0	1	1	0	2
12	5	62	12	14	108	*	-	-	-	-	-	-	-	-	-	-	-	-	-
1	8	63	1	21	6282	75	8	67	0	1	4	1	1	2	0	1	1	0	1
2	7	63	2	13	2706	140	22	118	-	-	-	-	-	-	-	-	-	-	-
2	13	63	2	18	543	*	-	-	-	-	-	-	-	-	-	-	-	-	-
2	27	63	3	11	4189	101	17	84	-	-	-	-	-	-	-	-	-	-	-
3	12	63	3	22	2207	197	51	146	3	13	20	3	3	14	0	6	3	2	4
3	27	63	4	1	2747	137	29	108	-	-	-	-	-	-	-	-	-	-	-
4	16	63	4	22	2608	172	38	134	-	-	-	-	-	-	-	-	-	-	-
4	22	63	4	26	2566	174	34	140	-	-	-	-	-	-	-	-	-	-	-
4	22	63		*	5174	173	36	137	2	10	14	3	2	8	1	4	2	1	3
5	15	63	5	20	2773	144	46	98	-	-	-	-	-	-	-	-	-	-	-
5	20	63	5	27	3559	103	27	76	1	7	9	1	1	7	0	2	1	1	6
6	3	63	6	10	2565	129	36	93	-	-	-	-	-	-	-	-	-	-	-
6	22	63	6	28	2130	132	30	102	2	8	11	2	1	8	0	3	2	1	3
7	5	63	7	12	2049	176	44	132	-	-	-	-	-	-	-	-	-	-	-
7	26	63	7	29	2335	139	33	106	-	-	-	-	-	-	-	-	-	-	-
7	26	63		*	4384	156	38	118	1	10	11	1	2	7	1	5	2	1	8
7	29	63	8	1	2382	161	34	127	-	-	-	-	-	-	-	-	-	-	-
8	17	63	8	28	2054	99	21	78	-	-	-	-	-	-	-	-	-	-	-
8	17	63		*	4436	132	28	104	0	8	10	2	1	7	0	3	2	1	4
9	3	63	9	6	2364	114	28	86	-	-	-	-	-	-	-	-	-	-	-
9	18	63	10	1	2143	88	12	76	-	-	-	-	-	-	-	-	-	-	-
9	18	63		*	4507	101	20	81	1	4	9	2	1	6	0	3	1	0	2

12 5 62 * INSUFFICIENT FLOW

2 13 63 * LOW FLOW

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT

LAREDO, TEXAS 045

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES — ROTIFERS											CRUSTACEA							NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
			1ST		2ND		3RD		4TH					NUM-BER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD		4TH		5TH		NUM-BER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	2	62	69	29	46	7	26	6	82	5	53	-	-	-											-							-	-
10	16	62										-	-	-											-							-	-
11	6	62										-	-	-											-							-	-
11	20	62	89	57	58	21	92	6	26	6	10	20	-	0											0							0	0
12	4	62	26	43	89	26	82	12	12	2	17	150	-	0											0							0	0
12	17	62	89	44	26	25	4	10	70	4	17	-	-	0											0							0	0
1	8	63	89	46	26	38	92	6	71	2	8	-	-	-											-							-	-
1	27	63	89	32	26	20	92	5	46	4	39	20	-	0											0							0	0
2	5	63	92	33	12	12	26	9	89	6	40	-	-	1											0							0	0
2	19	63	26	49	13	17	92	11	9	3	20	-	-	-											-							-	-
3	5	63	26	53	13	8	92	6	71	6	27	-	-	0											0							0	0
3	19	63	26	45	36	11	92	8	51	6	30	-	-	0											0							0	0
4	2	63	26	56	36	12	64	5	38	3	24	-	-	0											0							0	0
4	16	63	68	12	71	8	26	8	12	8	64	-	-	0											0							1	0
5	7	63										-	-	-											-							-	-
5	21	63	26	12	70	9	71	7	2	6	66	-	-	-											-							-	-
6	4	63										-	-	-											-							-	-
6	18	63										-	-	-											-							-	-
7	2	63										-	-	-											-							-	-
7	16	63										-	-	-											-							-	-
8	5	63										-	-	-											-							-	-
8	20	63										-	-	-											-							-	-
9	3	63										-	-	-											-							-	-
9	17	63										-	-	-											-							-	-

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT LAREDO, TEXAS 45

DATE OF SAMPLE: MONTH	DAY	YEAR	ALGAE (Number per milliliter): TOTAL	BLUE-GREEN: COCCOID	BLUE-GREEN: FILA-MENT-OUS	GREEN: COCCOID	GREEN: FILA-MENT-OUS	FLAGELLATED (Pigmented): GREEN	FLAGELLATED (Pigmented): OTHER	DIATOMS: CENTRIC	DIATOMS: PENNATE	INERT DIATOM SHELLS: CENTRIC	INERT DIATOM SHELLS: PENNATE	MOST ABUNDANT ALGAE · Genera and Count Level per ml. (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	6TH GENUS	6TH COUNT LEVEL	7TH GENUS	7TH COUNT LEVEL	8TH GENUS	8TH COUNT LEVEL	9TH GENUS	9TH COUNT LEVEL	10TH GENUS	10TH COUNT LEVEL
10	2	62	900	0	0	120	0	40	0	170	540	40	120	68	1	88	1																
10	16	62	300	0	0	0	0	0	0	0	330	0	40																				
11	6	62	100	0	0	0	0	0	0	30	30	30	110																				
11	20	62	11600	290	620	2460	0	1390	0	5050	1740	790	700	69	5	92	4	68	4	51	4	25	3	38	3	71	3	17	3	44	2	3	1
12	4	62	12600	0	0	3380	0	1820	0	4220	3150	250	250	25	5	92	4	51	4	88	2	38	2	87	1	28	1	35	1	78	1	29	1
12	17	62	3000	0	90	260	0	110	0	1760	810	180	460	68	4	92	2																
1	8	63	2200	0	20	40	0	70	0	1320	700	310	290	68	4	92	3																
1	27	63	2100	0	270	40	0	0	0	400	1410	360	840	92	3	68	2	17	1	88	1												
2	5	63	800	0	0	0	0	0	0	480	290	180	680	68	2																		
2	19	63	4300	0	20	90	0	20	20	1500	2640	200	880	68	4	78	3	92	3	87	1	88	1										
3	5	63	4400	0	460	420	0	40	610	1830	1070	1030	1700	63	3	17	2	38	2	88	1	78	1										
3	19	63	2600	0	70	330	0	40	20	400	1720	180	290	92	2	82	2	68	2	25	1	88	1	85	1	76	1						
4	2	63	3700	0	290	320	0	20	230	880	1970	230	110	68	3	82	3	88	2	17	1	87	1	63	1	92	1	38	1				
4	16	63	9300	20	40	1130	0	440	190	250	7220	1050	340	88	5	78	2	38	2	87	2	83	2	92	2	51	2	86	2	89	1	82	1
5	7	63	*	-	-	-	-	-	-	-	-	-	-																				
5	21	63	500	0	0	40	0	20	0	20	370	20	180																				
6	4	63	00	0	0	0	0	0	0	0	20	0	90																				
6	18	63	00	0	0	0	0	0	0	0	0	90	0																				
7	2	63	*	-	-	-	-	-	-	-	-	-	-																				
7	16	63	*	-	-	-	-	-	-	-	-	-	-																				
8	5	63	*	-	-	-	-	-	-	-	-	-	-																				
8	20	63	*	-	-	-	-	-	-	-	-	-	-																				
9	3	63	*	-	-	-	-	-	-	-	-	-	-																				
9	17	63	*	-	-	-	-	-	-	-	-	-	-																				

* TOO TURBID TO COUNT

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS
MAJOR BASIN WESTERN GULF
MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER
STATION LOCATION RIO GRANDE AT
LAREDO, TEXAS 45

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	2	62	27.0	-	8.4	-	-	-	-	-	82	142	248	-	1370	173	-	-	*50
10	9	62	28.0	-	8.3	-	-	-	-	-	54	100	268	-	10500	222	-	-	2600
10	16	62	27.7	-	8.3	-	-	-	-	-	80	137	242	-	2880	182	.0	650	-
10	23	62	23.8	-	8.3	-	-	-	-	-	24	93	133	-	-	-	-	-	-
10	30	62	22.5	-	8.4	-	-	-	-	-	92	140	252	-	2540	154	-	-	20000
11	6	62	20.0	-	8.3	-	-	-	-	-	100	138	280	-	2040	176	-	-	38000
11	13	62	17.8	-	8.4	-	-	-	-	-	105	155	286	-	665	174	-	-	680
11	20	62	16.0	-	8.3	-	-	-	-	-	110	135	270	-	103	195	-	-	100
11	27	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3000
11	28	62	21.0	-	8.3	-	-	-	-	-	190	133	324	-	1170	238	-	-	-
12	4	62	18.0	-	8.4	-	-	-	-	-	265	128	370	-	47	275	-	-	500
12	11	62	14.0	-	8.3	-	-	-	-	-	295	120	396	-	78	285	-	-	100
12	17	62	14.0	-	8.3	-	-	-	-	-	230	149	376	-	107	258	-	-	-
12	31	62	12.0	-	8.2	-	-	-	-	-	175	146	336	-	198	225	-	-	500
1	8	63	13.5	-	8.3	-	-	-	-	-	170	149	332	-	198	246	-	-	670
1	15	63	8.5	-	8.2	-	-	-	-	-	180	154	328	-	150	244	-	-	1000
1	22	63	9.5	-	8.3	-	-	-	-	-	175	159	338	-	150	279	-	-	50
1	29	63	8.5	-	8.1	-	-	-	-	-	160	160	342	-	120	238	-	-	*50
2	5	63	14.0	-	8.4	-	-	-	-	-	160	157	334	-	181	234	-	-	1000
2	12	63	13.0	-	8.2	-	-	-	-	-	155	148	318	-	194	234	-	-	400
2	19	63	13.0	-	8.2	-	-	-	-	-	155	145	310	-	214	225	-	-	300
2	26	63	15.0	-	8.3	-	-	-	-	-	140	146	302	-	238	205	-	-	100
3	5	63	20.0	-	8.4	-	-	-	-	-	160	137	314	-	180	237	-	-	100
3	12	63	21.0	-	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-	*50
3	19	63	23.0	-	8.3	-	-	-	-	-	165	129	304	-	99	224	-	-	500
3	26	63	23.0	-	8.3	-	-	-	-	-	170	129	310	-	58	240	-	-	500
4	2	63	23.0	-	8.3	-	-	-	-	-	175	122	306	-	47	244	-	-	200
4	9	63	24.0	-	8.2	-	-	-	-	-	140	123	276	-	432	188	-	-	2000
4	16	63	24.5	-	8.4	-	-	-	-	-	155	128	280	-	164	204	-	-	*50
4	23	63	27.0	-	8.4	-	-	-	-	-	145	118	278	-	116	237	-	-	100
4	30	63	26.1	-	8.4	-	-	-	-	-	125	115	262	-	532	180	-	-	-
5	7	63	24.0	-	7.9	-	-	-	-	-	96	98	210	-	3160	134	-	-	-
5	14	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
5	21	63	27.5	-	8.3	-	-	-	-	-	90	148	236	-	630	154	-	-	-
5	28	63	27.2	-	8.4	-	-	-	-	-	64	130	196	-	2000	92	-	-	4300
6	4	63	26.0	-	8.3	-	-	-	-	-	145	135	286	-	2400	183	-	-	-
6	11	63	28.1	-	8.4	-	-	-	-	-	94	139	246	-	9200	141	-	-	750
6	18	63	26.0	-	8.0	-	-	-	-	-	32	72	103	-	3300	57	-	-	100000
6	25	63	28.8	-	8.3	-	-	-	-	-	62	127	202	-	2500	122	-	-	6000

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /LOWER/ BELOW PECOS RIVER

STATION LOCATION RIO GRANDE AT
LAREDO, TEXAS 45

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	2	63	28.0	-	8.3	-	-	-	-	-	74	126	320	-	2960	269	-	-	*3
7	9	63	29.2	-	8.4	-	-	-	-	-	70	116	236	-	489	166	-	-	500
7	16	63	28.0	-	8.2	-	-	-	-	-	44	105	258	-	29600	272	-	-	-
7	23	63	28.9	-	8.4	-	-	-	-	-	74	115	322	-	4200	273	-	-	500
7	30	63	29.0	-	8.4	-	-	-	-	-	76	135	250	-	650	211	-	-	100
8	6	63	29.0	-	8.3	-	-	-	-	-	94	136	256	-	970	192	-	-	2500
8	13	63	29.0	-	8.4	-	-	-	-	-	62	124	226	-	9000	181	-	-	1000
8	20	63	29.0	-	8.4	-	-	-	-	-	60	127	244	-	9500	181	-	-	*20
8	27	63	29.0	-	8.4	-	-	-	-	-	62	120	242	-	12900	210	-	-	*20
9	3	63	28.8	-	8.3	-	-	-	-	-	68	130	264	-	1530	236	-	-	500
9	10	63	29.0	-	8.4	-	-	-	-	-	68	134	280	-	8000	273	-	-	*20
9	17	63	27.5	-	8.1	-	-	-	-	-	44	105	224	-	11000	188	-	-	-
9	24	63	27.0	-	8.1	-	-	-	-	-	36	105	196	-	13900	149	-	-	600

736-500 O - 64 - 9

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Laredo, Texas
Supplied by International Boundary and Water Commission

STATE Texas

MAJOR BASIN Western Gulf

MINOR BASIN Rio Grande/Lower/below Pecos River

STATION LOCATION Rio Grande at Laredo, Texas

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.000	2.930	1.850	1.750	1.480	1.340	.837	1.570	1.580	1.640	.664	1.220
2	5.010	2.590	1.850	1.750	1.480	1.240	.798	1.110	1.580	1.590	.678	1.190
3	4.380	2.360	1.830	1.800	1.450	1.180	.798	1.540	1.870	4.100	1.500	1.190
4	4.200	2.270	1.780	1.780	1.450	1.180	.713	1.350	2.970	2.590	1.820	1.120
5	3.390	2.200	1.830	1.780	1.410	1.160	5.650	1.150	1.930	1.540	1.730	.975
6	2.880	3.670	1.800	1.700	1.410	1.080	5.190	2.830	1.450	1.130	1.500	.922
7	2.970	2.500	1.730	1.660	1.340	1.020	2.430	8.400	1.190	1.050	1.250	2.430
8	2.820	2.050	1.700	1.610	1.310	1.020	1.670	5.440	1.030	.911	1.170	3.960
9	2.590	2.000	1.850	1.580	1.210	1.020	1.500	3.100	1.780	.833	1.250	4.700
10	2.290	1.950	1.920	1.680	1.180	.996	1.430	2.570	4.130	1.800	2.240	3.960
11	2.990	1.950	1.970	1.680	1.750	.996	1.340	2.330	1.990	3.470	2.850	3.920
12	3.330	1.950	1.900	1.610	1.490	1.020	1.700	2.440	2.860	2.880	2.420	2.950
13	3.160	1.950	1.800	1.560	1.340	.996	1.640	2.010	1.750	2.320	2.080	3.280
14	3.880	1.920	1.750	1.590	1.310	.918	1.500	1.820	1.220	1.900	1.730	7.270
15	2.770	1.840	1.730	1.680	1.310	.918	1.320	1.590	1.500	1.800	1.470	5.690
16	2.460	1.820	1.700	1.720	1.310	.918	1.150	1.380	1.750	1.860	1.310	4.480
17	2.360	1.790	1.750	1.720	1.240	.971	1.010	1.250	8.930	1.540	1.250	3.600
18	2.410	1.820	1.830	1.630	1.470	.996	.957	1.130	3.810	1.640	1.330	3.430
19	6.990	1.860	1.800	1.560	2.040	1.000	.830	1.250	2.320	1.920	1.820	4.630
20	14.000	1.840	1.750	1.520	2.270	.961	.795	1.620	3.260	1.860	4.310	4.520
21	7.420	1.820	1.730	1.520	1.980	.961	.830	1.070	3.410	1.750	3.740	3.100
22	15.300	1.820	1.750	1.560	1.730	.918	.812	1.120	3.140	1.390	2.390	2.550
23	6.110	1.790	1.750	1.590	1.630	.961	.759	1.480	2.610	1.260	1.890	2.270
24	4.130	1.770	1.830	1.540	1.530	.961	.759	3.270	2.160	1.160	1.770	2.140
25	4.660	1.750	1.900	1.540	1.490	.918	.724	2.630	1.990	1.190	2.170	1.890
26	3.810	3.420	1.950	1.520	1.460	.961	.932	1.960	1.930	1.030	2.040	1.760
27	3.460	3.640	1.880	1.540	1.310	.961	1.660	3.470	1.990	.890	2.300	1.630
28	3.110	2.160	1.850	1.490	1.290	.879	1.150	2.440	1.640	.773	1.890	1.570
29	3.100	2.000	1.830	1.520		.879	.957	1.860	1.930	.706	1.500	1.470
30	2.970	1.920	1.800	1.540		.879	3.040	1.590	2.110	.717	1.280	1.390
31	2.820		1.780	1.520		.879		1.520		.706	1.190	

RIO GRANDE AT EL PASO, TEXAS

The El Paso Surveillance System station is located near the point where the river starts to form the international boundary between the United States and Mexico. Samples are collected from the municipal water plant intake. The river forms the interstate boundary between New Mexico and Texas for approximately 20 miles above El Paso.

The Rio Grande at this point is regulated by Elephant Butte and Caballo Reservoirs upstream in New Mexico. From about mid-September to early March the flow at El Paso is in the range of one to several cubic feet per second. Throughout the remainder of the year the flow ranges from 300 to 2,500 cubic feet per second. La Cruces, New Mexico and Anthony, Texas, 45 and 19 miles upstream respectively, discharge secondary effluents with a combined loading of 4,600 population equivalents of BOD to the stream. El Paso, Texas, and Juarez, Mexico use the Rio Grande to provide half of their municipal supply needs.

The plankton sample from the Rio Grande at El Paso collected March 4, 1963, contained an unusually large population of rotifers. Two genera, Notholca and Gastropus, were found in large numbers with 3,064 per liter being present. Rotifers are tiny animal forms which consume algae or organic particles. There is no indication that algae counts were high and it is not known what stimulated the growth of the rotifers.

DDT, DDD, and dieldrin have been identified in carbon adsorption method samples from this station.

Station Location: Rio Grande at El Paso, Texas

Major Basin: Western Gulf

Minor Basin: Rio Grande/Upper/Above Pecos River

Station at: 31°46' Latitude 106°30' Longitude

Miles above mouth: 1,248

Activation Date: March 31, 1958

Sampled by: El Paso Public Service Board

Field Analysis by: El Paso Public Service Board

Other Cooperating Agencies: Texas State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: Below Caballo Dam, New Mexico

Gaging station operated by: U.S. Bureau of Reclamation

Drainage area at gaging station: 30,700 square miles with 2,940 non-contributary

Period of record: 1938 to present

Average discharge in record period: 942 cfs.

Maximum discharge in record period: 7,650 cfs.

Minimum discharge in record period: 0.1 cfs. (daily)

Remarks: Discharge figures do not include irrigation bypass around gaging station. Flow regulated at both Elephant Butte and Caballo Reservoirs, completed in 1916 and 1938, respectively.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite 10/1/62 to 12/31/62	Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.68	.80
	Na	280	170
	K	15	9.0
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*30	17
	Cd	*15	*8
	As	*50	*50
	B	375	155
	P	*38	*42
	Fe	*38	*17
	Mo	*15	*8
	Mn	*7.5	*8.4
	Al	—	*42
	Be	*.38	*.21
	Cu	38	*8
	Ag	*3	*2.1
	Ni	*15	*8
	Co	*30	*8
	Pb	*38	*21
	Cr	*8	*4
	V	*15	*14
	Ba	120	63
	Sr	2620	609

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.7	.2	April to June	—	—
January to March	—	—	July to September	1.9	.4

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
7 & 9/62(c)	DDT	
8/1 - 8/12/63	Dieldrin	0.001
8/1 - 8/12/63	DDD	0.004
8/1 - 8/12/63	DDT	0.012
7/2 - 7/10/63	DDT	0.004
7/2 - 7/10/63	DDD	0.001

(c) - Composite

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER

STATION LOCATION RIO GRANDE AT
EL PASO, TEXAS 46

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMI-NATION		ALPHA						BETA						DATE OF DETERMI-NATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	12	17	-	-	-	-	-	-	146	52	58	29	204	60						
10	8	62	12	14	-	-	-	-	-	-	11	57	21	70	32	90						
10	22	62	12	5	6	9	2	5	8	11	102	47	82	39	184	61						
10	29	62	12	24	-	-	-	-	-	-	19	21	51	29	70	36						
11	26	62	12	15	1	2	6	7	7	7	22	24	39	34	61	41						
12	17	62	1	31*	0	3	1	8	1	8	8	19	41	27	49	33						
1	28	63	3	1*	1	2	8	8	9	8	12	35	9	47	21	59						
2	25	63	3	18*	2	2	0	4	2	4	22	7	63	36	85	37						
3	25	63	4	15*	0	19	3	5	3	20	175	48	30	17	205	51						
4	29	63	5	22*	2	3	3	5	5	6	25	27	34	30	59	40						
5	27	63	6	19*	0	2	5	5	5	5	12	32	32	36	44	48						
6	24	63	7	23*	7	6	2	4	9	7	149	36	81	34	230	50						
7	29	63	8	16*	10	7	6	4	16	8	76	36	41	29	117	46						
8	5	63	9	6	2	2	4	6	6	6	61	16	30	40	91	43						
8	12	63	9	6	2	1	3	6	5	6	12	8	18	39	30	40						
8	19	63	9	6	12	7	7	4	19	8	47	22	7	29	54	36						
8	26	63	9	17	20	12	7	6	27	13	54	45	7	36	61	58						
9	3	63	9	17	38	35	0	10	38	36	377	115	26	32	403	119						
9	9	63	9	23	21	6	6	7	27	9	49	9	37	20	86	22						
9	16	63	10	10	1	1	9	7	10	7	6	7	0	33	6	34						
9	23	63	10	8	0	1	2	7	2	7	2	6	14	41	16	41						
9	30	63	10	17	0	1	0	3	0	3	1	5	28	44	29	44						

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER

STATION LOCATION RIO GRANDE AT

EL PASO, TEXAS 046

DATE OF SAMPLE: MONTH	DAY	YEAR	DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes): 1ST SPECIES	1ST PERCENT	2ND SPECIES	2ND PERCENT	3RD SPECIES	3RD PERCENT	4TH SPECIES	4TH PERCENT	OTHER SPECIES PERCENT	FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES: ROTIFERS NUMBER PER LITER	ROTIFERS GENERA AND COUNT LEVEL (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	CRUSTACEA NUMBER PER LITER	CRUSTACEA GENERA AND COUNT LEVEL (See text for Codes): 1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	1	62	12	14	11	14	65	9	10	8	55	-	-	-											-							-	-
10	15	62	26	8	65	7	12	7	68	6	72	0	0	0											0							0	0
11	5	62	12	14	97	11	71	7	10	6	62	0	0	0											0							0	0
11	19	62	12	36	71	14	10	7	5	7	36	-	0	0											0							0	0
12	3	62	12	83	71	7	11	1	85	1	8	20	0	0											2							0	0
12	17	62	12	45	71	11	11	6	86	4	34	-	-	1											1							0	0
1	7	63	71	24	12	19	70	5	4	5	47	0	-	-											-							-	-
1	22	63	12	54	71	26	64	3	74	2	15	-	0	0											0							0	0
2	4	63	65	38	71	26	70	7	26	7	22	-	-	0											0							0	0
2	18	63	12	57	71	34	92	3	54	1	5	-	-	0											0							0	0
3	4	63	12	33	8	15	70	13	92	10	29	-	-	3060	14	9	8	6							20	50	3					1	0
3	18	63										-	-	-											-							-	-
4	1	63										-	-	-											-							-	-
4	15	63	58	29	80	26	12	23	71	3	19	-	-	1											13	50	2	76	1			0	0
5	6	63										-	-	-											-							-	-
5	20	63	12	24	80	19	58	11	36	10	36	-	-	-											-							-	-
6	3	63	80	81	12	6	15	4	71	1	8	-	-	-											-							-	-
6	17	63										-	-	-											-							-	-
7	1	63	80	63	82	20	12	4			13	-	-	-											-							-	-
7	16	63										-	-	-											-							-	-
8	5	63	80	18	26	5	12	5	16	5	67	-	-	-											-							-	-
8	19	63										-	-	-											-							-	-
9	3	63										-	-	-											-							-	-
9	16	63	26	16	12	8	65	8	80	6	62	-	-	-											-							-	-

PLANKTON POPULATION

STATE TEXAS
MAJOR BASIN WESTERN GULF
MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER
STATION LOCATION RIO GRANDE AT
EL PASO, TEXAS 46

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	200	30	0	0	0	0	0	30	180	0	130																				
10	15	62	4700	0	90	90	0	110	0	140	4230	20	900	88	3	87	3	78	2	86	1	89	1	97	1								
11	5	62	2800	0	70	70	0	20	0	50	2590	0	1060	88	3	78	2	87	2	98	2	97	1	79	1								
11	19	62	2300	0	610	20	0	0	20	110	1580	0	1100	78	3	17	3	88	2														
12	3	62	1300	0	20	50	0	20	50	90	1060	20	990	78	3																		
12	17	62	1000	0	20	20	0	40	0	20	900	0	840	78	2	88	1																
1	7	63	1200	0	0	0	0	0	0	80	1130	0	170	88	2	78	1	87	1														
1	22	63	1500	0	20	0	0	40	0	70	1390	40	770	78	3	88	2																
2	4	63	2300	0	0	0	0	130	530	440	1170	70	950	87	2	62	2	88	2	68	2												
2	18	63	3400	0	0	0	0	530	380	130	2390	130	2690	78	4	88	3	52	2	65	2												
3	4	63	900	0	0	0	0	110	20	220	570	0	990																				
3	18	63	300	0	0	0	0	0	20	70	180	0	290																				
4	1	63	1700	0	20	20	0	20	20	780	860	670	1220	69	1																		
4	15	63	1700	20	0	110	0	180	0	920	510	350	970	71	3	78	1	69	1	51	1												
5	6	63	4600	0	20	150	0	240	0	2200	2000	1470	4510	51	1																		
5	20	63	1300	0	0	70	0	20	0	730	530	420	1740	71	3	78	1																
6	3	63	5500	60	250	500	0	20	60	2270	2350	710	1090	78	3	79	3	88	2	17	1												
6	17	63	9700	40	80	460	0	40	20	7900	1200	1130	800																				
7	1	63	11600	0	530	1000	0	330	0	8450	1300	2240	460	71	6	35	2	78	2	17	2	87	2	56	1	88	1						
7	16	63	7500	20	0	1940	0	70	950	3850	700	2350	260																				
8	5	63	1700	40	0	190	0	80	0	600	810	100	480	71	2	87	1																
8	19	63	3100	40	0	610	0	130	40	1700	580	410	1250																				
9	3	63	*	-	-	-	-	-	-	-	-	-	-																				
9	16	63	15400	0	0	2070	0	200	0	10890	2140	360	1640	68	6	71	5	69	4	25	4	87	3	38	2	88	1	78	1	44	1		

* TOO TURBID TO COUNT

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE TEXAS
MAJOR BASIN WESTERN GULF
MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER
STATION LOCATION RIO GRANDE AT
EL PASO, TEXAS 46

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES											
BEGINNING			END								NEUTRALS									
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
4	8	63	4	21	4965	166	36	130	1	9	15	1	1	12	1	4	2	1	4
5	2	63	5	11	5100	123	29	94	2	8	9	1	1	7	0	3	2	1	4
6	3	63	6	8	5212	102	27	75	1	7	9	1	1	7	0	3	3	1	3
7	2	63	7	10	5002	160	57	103	2	19	13	1	1	10	1	7	7	2	7
8	1	63	8	12	5287	123	26	97	0	7	11	1	2	8	0	3	2	0	3
9	4	63	9	15	4425	124	29	95	1	8	10	1	1	8	0	3	2	1	4

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS
MAJOR BASIN WESTERN GULF
MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER
STATION LOCATION RIO GRANDE AT
EL PASO, TEXAS 46

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	29	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150000
11	26	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100000
12	5	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000000
12	11	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93000
12	17	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62000
1	14	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46000
3	18	63	14.0	-	8.2	-	-	1.4	1.5	-	125	190	268	-	800	220	.2	689	100000
3	25	63	14.3	14.4	8.3	3.8	-	1.4	1.7	.0	125	180	286	0	600	310	.0	669	-
4	2	63	15.0	-	8.2	-	-	1.6	1.7	-	130	174	267	0	400	284	-	640	20000
4	9	63	13.2	-	8.6	-	-	1.4	1.6	-	140	195	312	0	210	291	.0	832	-
4	15	63	13.3	-	8.9	-	-	1.7	1.8	-	180	202	338	-	180	289	-	966	*400
4	29	63	15.5	15.2	8.4	3.4	-	1.7	2.2	-	215	224	364	0	-	324	.0	1014	10000
5	6	63	17.0	-	8.3	-	-	1.6	1.9	-	200	219	364	0	140	376	.0	1168	-
5	7	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5000
5	13	63	16.5	-	8.3	-	-	1.6	1.9	-	180	215	336	-	140	286	-	956	-
5	14	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2000
5	20	63	16.5	-	8.3	-	-	1.4	1.7	-	150	218	322	-	140	263	-	900	-
5	27	63	17.8	-	8.3	-	-	1.4	1.6	-	190	220	362	0	110	271	-	965	-
6	4	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*100
6	10	63	17.5	-	8.3	-	-	1.4	1.8	-	110	185	280	-	180	251	-	771	-
6	11	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*100
6	17	63	23.0	13.4	8.3	3.6	-	1.4	1.7	-	110	185	280	-	240	197	-	693	-
6	18	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1800
6	24	63	23.0	13.2	8.3	3.6	-	1.2	1.4	-	110	180	276	-	230	184	-	643	-
6	25	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1000
7	2	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45000
7	8	63	23.0	9.9	8.4	3.3	-	1.4	1.7	-	140	165	304	-	240	179	-	579	-
7	16	63	24.0	15.8	8.3	9.1	-	1.4	1.6	-	200	202	276	-	420	306	-	1041	-
7	22	63	23.0	11.8	8.3	3.8	-	1.4	1.7	-	115	176	270	-	340	181	-	638	-
7	29	63	23.0	11.4	8.2	3.4	-	1.4	1.5	-	150	195	296	-	280	179	-	626	-
8	13	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*50
8	27	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750
9	3	63	24.5	14.2	8.4	7.8	-	1.4	1.6	-	190	174	320	-	2200	279	-	981	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station below Caballo Dam, New Mexico
Operated by U.S. Bureau of Reclamation

STATE Texas

MAJOR BASIN Western Gulf

MINOR BASIN Rio Grande/Upper/above Pecos River

STATION LOCATION Rio Grande at El Paso, Texas

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.0021	.0015	.0015	.0014	.0015	.0015	2.250	.395	.992	1.980	.663	.957
2	.0020	.0015	.0016	.0014	.0015	.0015	1.900	.485	1.040	1.640	.581	.519
3	.0019	.0015	.0016	.0014	.0016	.0016	1.600	.690	1.040	1.380	.886	.465
4	.0018	.0015	.0016	.0015	.0016	.0016	1.560	.806	1.150	1.340	1.110	.421
5	.0018	.0015	.0015	.0015	.0016	.497	1.260	.796	1.300	1.320	1.060	.105
6	.0018	.0015	.0015	.0015	.0016	1.480	.996	.789	1.360	1.230	1.020	.598
7	.0017	.0015	.0015	.0015	.0016	1.650	.875	.812	1.450	1.030	.955	1.000
8	.0017	.0015	.0015	.0015	.0016	1.980	.770	.845	1.540	.916	.953	1.020
9	.0017	.0015	.0015	.0015	.0016	2.310	.676	.824	1.490	1.040	1.100	.964
10	.0016	.0015	.0015	.0015	.0015	2.310	.668	.818	1.360	1.180	1.250	.609
11	.0016	.0015	.0015	.0015	.0015	2.310	.615	.837	1.410	1.270	1.250	.0050
12	.0016	.0016	.0015	.0015	.0015	2.440	.557	.801	1.490	1.730	1.300	.0025
13	.0016	.0016	.0015	.0015	.0014	2.540	.536	.751	1.450	2.020	1.500	.0025
14	.0017	.0016	.0015	.0015	.0014	2.610	.546	.716	1.540	2.090	1.640	.0025
15	.0017	.0016	.0015	.0015	.0014	2.840	.509	.777	1.600	2.070	1.340	.0025
16	.0017	.0016	.0015	.0015	.0014	3.050	.437	.837	1.590	2.230	1.360	.0025
17	.0017	.0016	.0015	.0015	.0015	3.000	.394	.900	1.550	2.480	1.520	.0025
18	.0017	.0016	.0015	.0015	.0015	2.960	.436	.936	1.640	2.550	1.490	.0025
19	.0017	.0016	.0015	.0015	.0015	2.890	.542	.893	1.780	2.530	1.070	.0025
20	.0017	.0016	.0015	.0016	.0015	2.900	.576	.815	1.780	2.520	.977	.0025
21	.0016	.0016	.0015	.0016	.0015	2.950	.609	.738	2.020	2.530	1.090	.0025
22	.0016	.0016	.0015	.0016	.0015	2.970	.568	.707	2.280	2.380	1.030	.0025
23	.0016	.0016	.0015	.0015	.0015	2.860	.565	.658	2.290	2.110	1.120	.0025
24	.0016	.0016	.0014	.0015	.0015	2.810	.637	.629	2.250	1.950	1.150	.0025
25	.0016	.0015	.0014	.0015	.0015	2.820	.668	.617	2.030	1.980	1.200	.0025
26	.0016	.0015	.0014	.0015	.0015	2.620	.602	.605	1.860	1.900	1.140	.0025
27	.0016	.0015	.0014	.0015	.0015	2.450	.511	.665	1.860	1.880	1.330	.0025
28	.0015	.0015	.0014	.0015	.0015	2.530	.500	.795	1.880	1.730	1.500	.0025
29	.0015	.0015	.0014	.0015		2.480	.301	.880	1.990	1.570	1.500	.0025
30	.0015	.0015	.0014	.0015		2.320	.311	.941	1.980	1.280	1.280	.0025
31	.0015		.0014	.0015		2.330		.947		1.010	.980	

RIO GRANDE BELOW ALAMOSA, COLORADO

Samples are collected from Colorado State Highway 142 bridge. This is the uppermost surveillance station on the Rio Grande River and is located approximately 10 miles above the Colorado-New Mexico State Line in the San Luis Valley. This valley supports an extensive agricultural development with potatoes being the principal crop. In certain parts of the valley, the water table is quite high and the fields must be extensively drained to prevent a buildup of minerals in the root zone.

The nearest upstream municipal waste discharges include Alamosa along with Del Norte, and Monte Vista. An estimated total BOD population equivalent of 780 is discharged from lagoons. An oil refinery and a dairy also discharge wastes about three miles above this station.

Station Location:	Rio Grande below Alamosa, Colorado
Major Basin:	Western Gulf
Minor Basin:	Rio Grande/Upper/above Pecos River
Station at:	37°11' Latitude 105°44' Longitude
Miles above mouth:	1,755
Activation Date:	November 1, 1960
Sampled by:	Colorado State Department of Public Health
Field Analysis by:	Colorado State Department of Public Health
Other Cooperating Agencies:	None
Hydrologic Data:	
Nearest pertinent gaging station:	Near Lobatos, Colorado
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	7,700 square miles with 2,940 square miles non-contributing
Period of record:	1899 to present
Average discharge in record period:	633 cfs.
Maximum discharge in record period:	13,200 cfs.
Minimum discharge in record period:	0

Remarks: Flows affected by irrigation diversions and returns, transmountain diversions, and storage reservoirs.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.46	.55
	Na	34	40
	K	5.6	9.4
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	*6	*7
	Cd	*3	*4
	As	*28	*35
	B	78	82
	P	*7	*18
	Fe	13	*7
	Mo	*3	*4
	Mn	*1.4	*3.5
	Al	–	*18
	Be	*.07	*.09
	Cu	5	4
	Ag	*.6	*.9
	Ni	*3	*4
	Co	*6	*4
	Pb	*7	*9
	Cr	*1	*2
	V	*30	*20
	Ba	50	33
	Sr	308	238

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.5	.3	April to June	1.1	.2
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

STATE COLORADO

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER

STATION LOCATION RIO GRANDE BELOW

ALAMOSA, COLORADO 72

RADIOACTIVITY DETERMINATIONS

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER																RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA								DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL						ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±			MO.	DAY	pc/g	±	pc/g	±
10	1	62	10	30	0	1	3	2	3	2	17	13	37	17	54	21								
10	15	62	12	5	0	1	2	3	2	3	16	11	21	17	37	20								
11	23	62	1	4*	1	1	0	1	1	1	16	6	18	8	34	10								
12	31	62	1	23	0	1	2	2	2	2	0	20	10	9	10	22								
1	7	63	3	1	0	0	1	1	1	1	0	15	5	8	5	17								
2	25	63	3	22*	0	0	1	1	1	1	4	6	19	7	23	9								
3	11	63	4	22	0	1	1	2	1	2	10	3	56	5	66	6								
4	30	63	5	24*	0	1	2	2	2	2	20	15	18	14	38	21								
5	20	63	6	21*	0	1	2	2	2	2	16	5	26	5	42	8								
6	3	63	7	30	0	1	2	2	2	2	24	7	38	9	62	11								
7	29	63	9	9*	1	1	3	2	4	2	25	3	35	5	60	6								
8	12	63	9	6	2	1	2	2	4	2	46	8	34	9	80	12								
8	19	63	9	6	0	1	2	2	2	2	24	7	32	9	56	11								
8	26	63	9	17	1	1	1	1	2	1	11	6	26	8	37	10								
9	3	63	9	20	0	1	2	2	2	2	12	5	21	7	33	9								
9	16	63	10	4	0	1	3	2	3	2	8	6	24	8	32	10								
9	23	63	10	8	1	1	2	2	3	2	5	6	15	9	20	11								
9	30	63	10	17	0	1	2	2	2	2	1	5	17	8	18	9								

PLANKTON POPULATION

STATE COLORADO

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER

STATION LOCATION RIO GRANDE BELOW ALAMOSA, COLORADO 072

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)								
			1ST		2ND		3RD		4TH		
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT
10	1	62	92	39	46	16	26	8	36	6	31
10	15	62	92	21	36	15	46	15	65	8	41
11	4	62	46	15	48	15	16	11	92	6	53
11	23	62	46	23	92	22	36	11	64	9	35
1	7	63	92	32	36	25	12	12	46	5	26
2	4	63	12	30	92	11	71	10	85	6	43
2	18	63	12	24	92	16	46	12	36	10	38
3	11	63	92	36	46	21	12	11	36	10	22
3	19	63	92	20	46	16	36	12	12	9	43
4	1	63	46	25	92	17	36	15	71	11	32
4	15	63	92	21	36	20	71	10	12	8	41
5	6	63	82	48	46	15	70	6	92	6	25
5	20	63	92	18	46	15	71	14	12	13	40
6	3	63	92	17	46	11	26	6	36	5	61
7	2	63	46	31	82	9	51	8	26	7	45
7	15	63									
8	13	63	48	28	41	9	92	7	46	6	50
9	3	63	48	32	82	23	46	8	41	3	34
9	16	63	48	49	41	6	16	4	82	3	38
9	30	63	48	54	82	17	92	5	16	3	21

DATE OF SAMPLE			FUNGI AND SHEATHED BACTERIA *Number per ml.*	PROTOZOA (Identifiable) *Number per ml.*	MICROINVERTEBRATES: ROTIFERS											CRUSTACEA							NEMATODES (Identifiable) *Number per liter*	OTHER ANIMAL FORMS (Number per liter)
					NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD			
MONTH	DAY	YEAR				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	1	62	0	0	243	11	5	17	5	7	2	15	1			0							1	0
10	15	62	70	0	1											0							0	0
11	4	62	0	-	0											0							0	0
11	23	62	50	0	0											0							0	0
1	7	63	0	0	1											0							0	0
2	4	63	-	-	-											-							-	-
2	18	63	0	0	0											0							0	0
3	11	63	-	-	0											0							2	1
3	19	63	-	0	0											0							0	0
4	1	63	0	0	0											0							0	1
4	15	63	-	-	0											0							0	0
5	6	63	-	-	-											-							-	-
5	20	63	-	-	-											-							-	-
6	3	63	-	-	-											-							-	-
7	2	63	-	-	-											-							-	-
7	15	63	-	-	-											-							-	-
8	13	63	-	-	-											-							-	-
9	3	63	-	-	-											-							-	-
9	16	63	-	-	-											-							-	-
9	30	63	-	-	-											-							-	-

PLANKTON POPULATION

STATE COLORADO

MAJOR BASIN WESTERN GULF

MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER

STATION LOCATION RIO GRANDE BELOW ALAMOSA, COLORADO 72

Date of Sample: Month	Day	Year	Total	Algae (Number per milliliter): Blue-Green: Coccoid	Blue-Green: Fila-mentous	Green: Coccoid	Green: Fila-mentous	Flagellated (Pigmented): Green	Flagellated: Other	Diatoms: Centric	Diatoms: Pennate	Inert Diatom Shells: Centric	Inert Diatom Shells: Pennate	Most Abundant Algae - Genera and Count Level per ml. (See text for Codes): 1st Genus	1st Count Level	2nd Genus	2nd Count Level	3rd Genus	3rd Count Level	4th Genus	4th Count Level	5th Genus	5th Count Level	6th Genus	6th Count Level	7th Genus	7th Count Level	8th Genus	8th Count Level	9th Genus	9th Count Level	10th Genus	10th Count Level
10	1	62	6700	40	0	230	0	830	0	2730	2860	460	660	68	4	92	4	51	2	87	2	57	1	69	1	82	1	88	1				
10	15	62	3200	0	0	160	0	70	0	970	2000	500	1600	68	3	92	2	82	2	87	2	88	1	69	1								
11	4	62	1200	0	0	50	0	0	0	90	1100	200	2340	84	1	87	1																
11	23	62	1500	0	20	50	0	50	0	230	1190	230	2230	92	1	87	1																
1	7	63	300	0	0	30	0	0	0	20	230	0	170																				
2	4	63	300	0	0	20	0	40	0	40	220	0	180																				
2	18	63	600	0	0	0	0	130	70	20	420	90	680																				
3	11	63	100	0	0	0	0	20	60	0	20	0	60																				
3	19	63	2600	0	40	570	0	290	340	170	1160	340	3380	26	2	63	1	92	1	84	1	51	1										
4	1	63	17800	970	0	7140	0	710	420	420	8150	1090	10460	26	6	92	4	84	4	82	4	88	3	3	3	78	2	52	2	63	2	79	2
4	15	63	3600	0	0	260	0	240	110	770	2220	290	5720	84	3	92	2	82	2	88	1	52	1										
5	6	63	15100	60	150	130	20	0	760	10370	3650	920	4070	71	6	87	3	88	3	63	3	68	3	92	2	84	2	69	1	91	1	78	1
5	20	63	1500	0	0	20	0	0	0	180	1280	260	5810	92	1	88	1	84	1	78	1												
6	3	63	1100	0	0	20	0	150	20	70	840	150	3480	84	1	92	1																
7	2	63	5700	180	400	1100	0	1520	0	1010	1540	750	950	57	4	71	2	68	2	33	2	17	2	88	1	69	1	91	1	87	1	35	1
7	15	63	1700	0	0	310	0	440	20	480	500	210	2030	38	1																		
8	13	63	4800	50	50	1230	0	120	0	100	3270	200	5730	84	3	25	2	38	2	88	2	87	1	98	1	92	1	78	1				
9	3	63	19200	40	0	5160	0	70	0	11910	2000	7890	5660	71	7	38	5	68	3	84	3	25	3	69	2	87	1	24	1	88	1		
9	16	63	11000	50	0	4960	0	250	0	4550	1100	2970	3740	38	5	71	5	68	4	25	2	84	2	24	2	31	1	41	1				
9	30	63	11400	20	0	1830	0	3280	70	4570	1630	1580	1540	71	5	57	5	38	3	84	3	68	2	88	1	51	1	25	1	92	1	24	1

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE COLORADO
MAJOR BASIN WESTERN GULF
MINOR BASIN RIO GRANDE /UPPER/ ABOVE PECOS RIVER
STATION LOCATION RIO GRANDE BELOW ALAMOSA, COLORADO

72

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
8	12	63	-	-	-	-	-	-	-	-	20	140	150	5	*25	95	.1	310	-
8	19	63	-	-	-	-	-	-	-	-	20	170	150	15	*25	105	.1	370	-
8	26	63	-	-	-	-	-	-	-	-	13	136	104	5	*25	42	.1	240	-
9	3	63	-	-	-	-	-	-	-	-	8	130	130	5	*25	44	.2	230	-
9	16	63	-	-	-	-	-	-	-	-	11	152	120	10	*25	48	.1	270	-
9	23	63	-	-	-	-	-	-	-	-	12	148	116	5	*25	50	.1	240	-
9	30	63	-	-	-	-	-	-	-	-	13	148	112	5	*25	47	.1	260	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Lobatos, Colorado
Operated by U.S. Geological Survey

STATE	Colorado
MAJOR BASIN	Western Gulf
MINOR BASIN	Rio Grande/Upper/above Pecos River
STATION LOCATION	Rio Grande below Alamosa, Colorado

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.060	.088	.251			.390	.289	.029	.039	.008	.014	.032
2	.058	.102	.251			.380	.280	.027	.039	.008	.011	.030
3	.062	.289	.264			.410	.243	.026	.040	.007	.007	.029
4	.069	.485	.276			.200	.211	.022	.040	.010	.010	.025
5	.073	.059	.264			.360	.192	.018	.039	.011	.034	.034
6	.069	.639	.247			.384	.177	.018	.037	.008	.018	.033
7	.069	.667	.247			.390	.184	.017	.034	.006	.012	.024
8	.069	.674	.243			.400	.196	.018	.034	.006	.010	.023
9	.067	.710	.259			.400	.196	.020	.036	.009	.017	.022
10	.062	.710	.276			.401	.227	.020	.033	.012	.012	.025
11	.056	.702	.268			.368	.272	.024	.027	.013	.009	.024
12	.054	.667	.251			.363	.272	.030	.026	.033	.020	.020
13	.053	.348	.251			.368	.196	.044	.025	.020	.030	.019
14	.051	.223	.235			.294	.177	.047	.024	.013	.018	.019
15	.049	.199	.227	.143	.315	.303	.177	.045	.022	.013	.011	.019
16	.065	.188	.231			.300	.199	.040	.019	.013	.009	.019
17	.067	.153	.239			.280	.203	.054	.022	.013	.012	.017
18	.076	.130	.247			.289	.177	.049	.022	.012	.015	.017
19	.078	.180	.227			.280	.140	.120	.022	.012	.012	.015
20	.082	.220	.231			.289	.117	.088	.022	.010	.009	.016
21	.092	.268	.223			.264	.100	.065	.020	.010	.009	.019
22	.092	.272	.200			.243	.085	.056	.019	.009	.019	.023
23	.100	.259	.160			.235	.080	.049	.015	.012	.040	.023
24	.100	.284	.140			.280	.054	.042	.013	.009	.045	.022
25	.095	.284	.130			.284	.045	.040	.010	.006	.039	.022
26	.098	.284	.120			.276	.044	.042	.010	.007	.037	.018
27	.095	.276	.130			.308	.045	.060	.010	.006	.036	.013
28	.090	.280	.150			.318	.039	.060	.012	.005	.033	.009
29	.085	.268	.160			.280	.034	.060	.009	.004	.033	.008
30	.082	.255	.160			.313	.030	.056	.009	.002	.036	.007
31	.085		.160			.298		.045		.004	.029	

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SABINE RIVER NEAR RULIFF, TEXAS

The Sabine River forms the boundary between Texas and Louisiana for approximately 180 miles. The Public Health Service Water Pollution Surveillance System station is located on the Sabine River Authority Canal which supplies industrial and agricultural water to the Orange-Beaumont area. Samples are collected at the Sabine River Authority pumping plant. The 1962 Inventory of Municipal Waste Facilities shows that 34 communities in both Texas and Louisiana discharge both treated and untreated municipal wastes to the main stem or a tributary. There are, however, no significant discharges within 100 miles of the station. Oil fields have been developed in the upstream drainage basin. Some irrigation diversion is made for rice.

Station Location: Sabine River near Ruliff, Texas

Major Basin: Western Gulf

Minor Basin: Sabine River

Station at: 30°14' Latitude 93°44' Longitude

Miles above mouth: 40

Activation Date: May 25, 1960

Sampled by: Sabine River Authority

Field Analysis by: U.S. Public Health Service

Other Cooperating Agencies: U.S. Geological Survey
Texas State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: Near Ruliff, Texas

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 9,329 square miles

Period of record: 1924 to present

Average discharge in record period: 8,842 cfs.

Maximum discharge in record period: 121,000 cfs.

Minimum discharge in record period: 270 cfs.

Remarks: Diversions above gaging station for municipal and industrial use.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/1

ELEMENTAL ANALYSES

		Composite Interval	
		10/1/62 to 12/31/62	4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.07	.15
	Na	34	35
	K	3.2	3.5
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	396	47
	Cd	*2	*2
	As	*17	*7
	B	53	87
	P	*9	*9
	Fe	167	28
	Mo	*2	*4
	Mn	.6	*1.7
	Al	—	9
	Be	*.04	*.04
	Cu	17	15
	Ag	.4	*.4
	Ni	*1	*2
	Co	*4	*2
	Pb	*9	*4
	Cr	*1	*4
	V	*2	*9
	Ba	70	55
	Sr	211	157

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.4	.2	April to June	-	-
January to March	—	—	July to September	3.2	1.1

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS
WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values. See page 21.

RADIOACTIVITY DETERMINATIONS

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN SABINE RIVER

STATION LOCATION SABINE RIVER NEAR RULIFF, TEXAS

73

DATE SAMPLE TAKEN			DATE OF DETERMINATION		RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
					ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	11	29	–	–	–	–	–	–	2	6	4	6	6	8						
10	8	62	11	8	–	–	–	–	–	–	3	6	6	7	9	9						
10	15	62	11	15	–	–	–	–	–	–	5	6	4	7	9	9						
10	22	62	11	17	0	0	0	1	0	1	8	6	15	7	23	9						
10	29	62	11	26	–	–	–	–	–	–	9	3	13	4	22	5						
11	26	62	12	20*	0	1	0	1	0	1	26	6	13	6	39	8						
12	31	62	1	24*	0	1	1	1	1	1	32	7	38	8	70	11						
1	28	63	2	21*	2	1	0	1	2	1	48	8	64	8	112	11						
2	25	63	3	20*	0	1	0	0	0	1	49	7	43	8	92	11						
3	25	63	4	16*	1	1	0	1	1	1	37	8	36	7	73	11						
4	30	63	5	24*	0	0	0	1	0	1	26	7	31	8	57	11						
5	27	63	6	24*	2	1	1	1	3	1	47	4	52	4	99	6						
6	24	63	7	30*	1	1	0	1	1	1	23	7	35	8	58	11						
7	29	63	8	21*	2	1	0	1	2	1	52	8	35	8	87	11						
8	26	63	10	2*	0	1	0	0	0	1	6	11	20	8	26	14						
9	23	63	10	31*	0	0	1	1	1	1	11	6	46	15	57	16						

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN SABINE RIVER

STATION LOCATION SABINE RIVER NEAR RULIFF, TEXAS

073

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)								
			1ST		2ND		3RD		4TH		
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT
10	1	62	26	91	58	3	65	1	56	1	4
10	15	62	26	89	58	4	57	3	56	1	3
11	5	62	26	81	71	6	10	3	57	1	9
11	19	62	26	94	57	2	58	2	65	1	1
12	3	62	26	69	58	4	57	2	56	2	23
12	17	62	92	33	26	17	36	15	53	5	30
1	7	63									
1	21	63	65	20	36	9	92	7	38	6	58
2	4	63	92	35	82	31	26	9	57	6	19
2	25	63	92	59	26	5	70	3	57	3	30
3	4	63	92	27	80	23	26	6	57	5	39
3	18	63	82	46	92	27	26	11	89	10	6
4	1	63	89	42	26	32	92	6	58	5	15
4	15	63	26	35	82	24	57	8	27	5	28
5	13	63	65	30	86	23	36	12	92	7	28
5	20	63	26	50	92	12	82	4	58	2	32
6	10	63	30	73	26	15	23	3	57	2	7
6	17	63	26	75	82	5	58	3	57	3	14
8	5	63									
8	19	63									
9	2	63									
9	16	63									

DATE OF SAMPLE			FUNGI AND SHEATHED BACTERIA Number per ml.	PROTOZOA (Identifiable) Number per ml.	MICROINVERTEBRATES																		
					ROTIFERS											CRUSTACEA								
					NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes) 1ST		2ND		3RD		NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
MONTH	DAY	YEAR				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	1	62	20	0	2	11	1	2	1							10	76	2	50	1			0	0
10	15	62	-	-	8	15	1									0							0	0
11	5	62	-	-	1											2							0	0
11	19	62	-	-	0											0							0	0
12	3	62	-	-	0											0							0	0
12	17	62	-	-	0											0							0	0
1	7	63	-	-	25	19	3									0							1	0
1	21	63	-	-	0											0							0	0
2	4	63	-	-	1											0							0	0
2	25	63	-	-	0											0							0	0
3	4	63	-	-	1											0							0	0
3	18	63	-	-	4											0							1	1
4	1	63	-	-	1											1							0	0
4	15	63	-	-	0											1							0	0
5	13	63	-	-	-											-							-	-
5	20	63	-	-	-											-							-	-
6	10	63	-	-	-											-							-	-
6	17	63	-	-	-											-							-	-
8	5	63	-	-	-											-							-	-
8	19	63	-	-	-											-							-	-
9	2	63	-	-	-											-							-	-
9	16	63	-	-	-											-							-	-

PLANKTON POPULATION

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN SABINE RIVER

STATION LOCATION SABINE RIVER NEAR RULIFF, TEXAS 73

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	10200	210	80	700	0	660	20	7990	540	200	330	68	6	51	3	69	3	38	2	87	1										
10	15	62	2400	0	0	10	0.	0	0	2390	20	250	20	68	4	69	1																
11	5	62	1600	20	0	180	0	30	0	1160	180	380	60	68	3																		
11	19	62	1500	0	0	90	0	20	0	1370	20	70	20	68	4																		
12	3	62	1100	0	0	40	0	80	40	600	330	120	80	68	5																		
12	17	62	300	0	0	70	0	20	0	110	110	370	200																				
1	7	63	00	0	0	0	0	0	0	20	0	0	20																				
1	21	63	200	0	0	20	0	70	0	90	0	0	90																				
2	4	63	200	0	0	20	0	140	50	20	30	30	20																				
2	25	63	200	0	0	0	0	40	110	0	70	20	70																				
3	4	63	200	0	0	0	0	40	40	0	150	20	70																				
3	18	63	3100	0	20	270	0	190	970	1240	400	150	130	71	3	65	3	92	2	68	1	60	1	51	1								
4	1	63	700	0	0	20	0	20	0	440	260	130	130	68	1	92	1																
4	15	63	400	0	0	60	0	0	150	180	40	0	0																				
5	13	63	200	0	0	70	0	0	0	90	40	110	290																				
5	20	63	1300	0	0	20	0	20	20	60	1130	80	150	92	2	88	1	87	1														
6	10	63	400	0	0	0	0	70	0	290	70	310	110	68	1																		
6	17	63	200	0	0	0	0	0	0	140	70	150	40																				
8	5	63	200	0	0	110	0	0	0	0	40	20	70																				
8	19	63	300	20	0	170	0	20	0	0	60	20	20																				
9	2	63	200	0	0	140	0	50	20	0	20	50	50																				
9	16	63	400	230	0	70	0	20	20	20	20	50	20																				

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER

(Parts per billion)

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN SABINE RIVER

STATION LOCATION SABINE RIVER NEAR RULIFF, TEXAS

73

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES											
BEGINNING			END								NEUTRALS									
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	9	62	11	24	2000	384	84	300	1	19	29	4	2	19	4	11	10	2	12
12	13	62	12	19	2780	480	105	375	1	26	36	2	2	32	0	14	10	2	16
1	8	63	1	16	2660	450	126	324	-	-	-	-	-	-	-	-	-	-	-
2	7	63	2	11	2780	312	79	233	1	21	25	3	2	19	1	8	9	2	13
3	4	63	3	11	2530	590	134	456	-	-	-	-	-	-	-	-	-	-	-
3	26	63	3	30	2710	304	153	151	3	42	44	5	5	29	5	15	18	3	28
4	24	63	4	28	3000	367	137	230	-	-	-	-	-	-	-	-	-	-	-
5	20	63	5	24	3140	333	155	178	7	41	27	2	3	22	0	15	23	2	40
6	15	63	6	19	3060	289	102	187	-	-	-	-	-	-	-	-	-	-	-
7	10	63	7	14	3320	277	132	145	5	30	27	1	3	22	1	12	18	1	39
8	5	63	8	26	4010	258	75	183	-	-	-	-	-	-	-	-	-	-	-
8	20	63	8	24	2970	287	108	179	5	24	30	5	4	20	1	12	18	1	18
9	9	63	9	14	2880	227	93	134	-	-	-	-	-	-	-	-	-	-	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS

MAJOR BASIN WESTERN GULF

MINOR BASIN SABINE RIVER

STATION LOCATION SABINE RIVER NEAR RULIFF, TEXAS

73

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	8	62	-	-	7.4	-	-	-	-	-	30	28	40	20	*25	17	.0	106	-
10	15	62	-	-	7.2	-	-	-	-	-	44	36	32	20	*25	13	.0	169	-
10	29	62	-	-	7.4	-	-	-	-	-	61	24	48	20	*25	18	.0	175	-
11	5	62	-	-	7.7	-	-	-	-	-	99	32	48	10	*25	15	.0	234	-
11	12	62	-	-	7.4	-	-	-	-	-	51	24	56	10	*25	16	.0	160	-
11	19	62	-	-	7.9	-	-	-	-	-	78	48	40	5	*25	15	.0	160	-
12	10	62	-	-	8.1	-	-	-	-	-	77	26	56	5	*25	20	.0	223	-
12	17	62	-	-	7.5	-	-	-	-	-	55	20	48	25	*25	27	.0	180	-
12	24	62	-	-	7.5	-	-	-	-	-	34	22	48	0	*25	20	.0	155	-
12	31	62	-	-	7.8	-	-	-	-	-	15	14	52	0	*25	26	.0	100	-
1	7	63	-	-	7.1	-	-	-	-	-	32	16	32	-	*25	25	.0	130	-
1	14	63	-	-	7.7	-	-	-	-	-	48	20	44	-	*25	28	.0	160	-
1	21	63	-	-	6.9	-	-	-	-	-	24	16	44	-	*25	20	.0	90	-
1	28	63	-	-	7.7	-	-	-	-	-	34	14	44	-	*25	25	.0	140	-
2	4	63	-	-	7.4	-	-	-	-	-	49	22	56	25	*25	26	.0	150	-
2	11	63	-	-	7.6	-	-	-	-	-	48	20	44	15	*25	25	.0	160	-
2	18	63	-	-	7.4	-	-	-	-	-	59	24	52	15	*25	25	.0	175	-
3	4	63	-	-	7.6	-	-	-	-	-	40	14	48	25	*25	25	.0	158	-
3	11	63	-	-	7.1	-	-	-	-	-	38	12	40	35	*25	25	.0	151	-
3	18	63	-	-	6.5	-	-	-	-	-	43	24	52	30	*25	23	.0	145	-
3	25	63	-	-	7.0	-	-	-	-	-	66	24	68	25	*25	38	.0	210	-
4	1	63	-	-	6.9	-	-	-	-	-	65	24	68	10	*25	36	.0	210	-
4	8	63	-	-	8.2	-	-	-	-	-	68	28	64	10	65	30	.0	191	-
4	15	63	-	-	7.2	-	-	-	-	-	57	20	44	30	*25	25	.0	140	-
4	22	63	-	-	7.1	-	-	-	-	-	51	28	52	25	*25	28	.0	143	-
4	28	63	-	-	-	-	-	-	-	-	51	32	52	15	*25	23	.0	170	-
5	6	63	-	-	-	-	-	-	-	-	69	32	52	5	*25	26	.0	230	-
5	13	63	-	-	-	-	-	-	-	-	33	16	32	25	*25	17	.0	105	-
5	20	63	-	-	-	-	-	-	-	-	24	24	40	40	*25	24	.0	132	-
5	27	63	-	-	-	-	-	-	-	-	44	42	60	35	*25	20	.0	183	-
6	3	63	-	-	-	-	-	-	-	-	48	36	56	15	*25	19	.0	174	-
6	10	63	-	-	-	-	-	-	-	-	68	34	68	15	*25	22	.0	180	-
6	17	63	-	-	-	-	-	-	-	-	103	36	72	20	*25	24	.0	250	-
6	24	63	-	-	-	-	-	-	-	-	79	32	48	10	*25	27	.0	250	-
7	1	63	-	-	-	-	-	-	-	-	125	30	52	10	*25	19	.0	181	-
7	8	63	-	-	-	-	-	-	-	-	38	30	44	20	*25	10	.0	121	-
7	15	63	-	-	-	-	-	-	-	-	42	22	36	20	*25	14	.0	130	-
7	22	63	-	-	-	-	-	-	-	-	67	28	48	15	*25	14	.0	178	-
7	29	63	-	-	-	-	-	-	-	-	35	20	44	20	*25	7	.0	103	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE TEXAS
MAJOR BASIN WESTERN GULF
MINOR BASIN SABINE RIVER
STATION LOCATION SABINE RIVER NEAR
RULIFF, TEXAS

73

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l.	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
8	5	63	-	-	-	-	-	-	-	-	45	28	44	15	*25	11	•0	132	-
8	12	63	-	-	-	-	-	-	-	-	52	32	40	10	*25	9	•0	157	-
8	19	63	-	-	-	-	-	-	-	-	97	36	44	10	*25	11	•0	240	-
8	26	63	-	-	-	-	-	-	-	-	58	38	44	5	*25	9	•0	150	-
9	3	63	-	-	-	-	-	-	-	-	70	34	48	5	*25	11	•0	182	-
9	9	63	-	-	-	-	-	-	-	-	48	32	48	15	*25	10	•0	150	-
9	16	63	-	-	-	-	-	-	-	-	48	36	40	15	*25	13	•0	150	-
9	23	63	-	-	-	-	-	-	-	-	22	20	20	10	*25	5	•0	52	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Ruliff, Texas
Operated by U.S. Geological Survey

STATE Texas

MAJOR BASIN Western Gulf

MINOR BASIN Sabine River

STATION LOCATION Sabine River near Ruliff, Texas

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	1.600	1.160	2.720	9.300	2.960	6.080	2.160	1.320	1.640	1.240	.940	.500
2	1.480	1.080	2.360	10.300	3.100	5.300	2.060	1.280	1.600	1.480	.852	.455
3	1.360	1.040	2.260	10.600	3.170	5.100	2.010	1.360	1.600	1.680	.800	.455
4	1.280	1.010	2.360	9.950	3.100	5.540	1.960	1.520	1.640	1.680	.800	.485
5	1.200	1.010	2.600	8.080	2.960	5.940	1.860	2.160	1.640	1.680	.852	.470
6	1.120	.975	2.780	6.560	2.780	5.940	1.860	3.240	1.600	1.680	.870	.425
7	1.040	.975	2.840	5.540	2.660	5.660	1.860	4.150	1.560	1.600	.782	.398
8	1.040	.975	2.780	5.300	2.540	5.660	2.260	4.700	1.440	1.520	.695	.398
9	1.080	.975	2.780	5.200	2.480	5.540	3.240	5.000	1.360	1.400	.665	.386
10	1.120	.940	2.780	4.900	2.420	5.300	4.330	5.300	1.280	1.240	.712	.386
11	1.200	.940	2.840	4.600	2.360	4.900	5.300	5.540	1.240	1.240	.800	.398
12	1.280	.940	2.960	4.510	2.360	4.510	5.660	5.660	1.240	1.480	.818	.412
13	1.280	.940	3.030	4.330	2.360	4.600	5.660	5.800	1.360	1.810	.730	.398
14	1.280	.940	3.170	4.330	2.480	5.000	5.420	6.080	1.440	2.110	.650	.425
15	1.240	.940	3.240	4.150	2.600	5.200	4.900	6.240	1.480	2.010	.590	.398
16	1.240	.980	3.100	3.990	2.660	5.100	4.150	6.240	1.400	1.760	.560	.398
17	1.240	1.020	2.840	3.910	2.600	4.700	3.450	6.400	1.280	1.600	.560	.818
18	1.280	1.070	2.540	4.070	2.840	4.150	2.840	6.560	1.160	1.480	.605	12.700
19	1.240	1.120	2.260	4.420	4.750	3.750	2.420	6.920	1.080	1.400	.635	20.700
20	1.240	1.280	2.060	4.900	6.740	3.450	2.160	7.100	1.080	1.280	.590	18.000
21	1.280	1.400	1.860	5.200	8.520	3.240	1.960	7.100	1.240	1.160	.575	11.800
22	1.400	1.640	1.910	5.200	9.950	3.030	1.860	7.100	1.440	1.120	.545	7.060
23	1.440	2.060	2.360	5.100	10.600	2.960	1.760	6.920	1.480	1.040	.545	4.360
24	1.600	2.110	3.580	4.800	9.950	2.900	1.680	5.540	1.440	1.010	1.260	2.720
25	1.680	1.960	4.900	4.420	8.780	2.840	1.600	3.990	1.320	1.040	1.400	1.720
26	1.680	1.760	5.420	4.070	7.880	2.780	1.560	3.030	1.320	1.280	1.040	1.280
27	1.640	1.760	5.660	3.750	7.480	2.720	1.480	2.480	1.360	1.860	.818	1.040
28	1.520	2.160	5.540	3.520	6.920	2.600	1.440	2.160	1.320	1.960	.680	.975
29	1.360	2.660	5.660	3.310		2.480	1.400	2.010	1.240	1.680	.590	.940
30	1.280	2.960	6.080	3.170		2.360	1.360	1.860	1.200	1.320	.530	.975
31	1.240		7.680	3.030		2.260		1.760		1.080	.515	

U. S. GOVERNMENT PRINTING OFFICE : 1964 O - 736-500